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Effects Of Blood Lead, Smoking Habits And Nutritional Status Toward Cystatin C Serum

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Abstract: *Raw pigments materials typically used powder and aluminum paste containing 60% of FeO, ZnO, Zn; 27% of Pb and Cr-containing compound; and 13% other compounds Using spray paint commonly found in a variety of industries, such as automobile painting industry. The aim of research to analyze the effects of blood lead, smoking habits and nutritional status of the cystatin C serum. This study is observational with cross sectional study. The population in this study is exposed and unexposed groups with each 12 samples of each group. Analysis of data using multiple linear regressions. Results showed no effect of blood lead with Cystatin C (β = 0.374 p =0.044), there was the influence of nutritional status and serum cystatin C (β=0.604 p=0.001), there was no effect of smoking and serum cystatin C (β = -0.265: p = 0.164). The results showed that the serum level of Cystatin C is affected by blood lead levels and nutritional status while smoking habit there is no relationship.*

Keywords: Blood Lead: Cystatin C: Smoking: Nutritional Status**.**

1. Introduction

East Java is the province that is quite dense in its activity as seen from one of the cities in the region, namely Surabaya, as a metropolitan city, Surabaya will certainly be very busy city. It is proved by the activity of vehicles in this area. the increase in the number of vehicles either two-wheel or four wheel in the region of Surabaya, then of course it will also give effect to the increase in the number of industries or services engaged in the automotive and the like, one of which is the painting workshop. Based on previous studies, there are several car painting workshop in Surabaya who do not have adequate ventilation is good, it is like in the car painting workshop at the study site, this can have an impact on increasing the potential risk of exposure to hazardous substances contained in such painting workshop Lead can come from paints used or paint drying agent contained in the paint.

In case of exposure to lead pollution in low doses, it can cause disruption of lead in the body without showing any clinical symptoms (Naurot et al, 2006). According to Spivey, 2007, Lead proven to increase the number of deaths in patients with heart disease. Until now, could not be determined how low levels of lead in the body are safe for health.

Lead and its compounds into the human body through the respiratory system and digestive tract, whereas absorption through the skin is very small so that it can be ignored. The dangers posed by Pb depends on particle size. Particles smaller than 10 g can be retained in the lungs, whereas larger particles settle in the upper respiratory tract (Ardyanto, 2006)

Pb poisoning symptoms usually varies which is an indicator of central nervous breakdown. The symptoms are often found were: abdominal pain, gastrointestinal disorders are nausea, diarrhea or constipation, peripheral nervous neuropathy, muscle weakness especially the hands and feet, lethargy and weakness, headache, loss of appetite, weight loss, anemia, hiperiritasi, sleep disorders, depression. In addition, the results of psychological tests and neuropsikologic shows memory loss, lack of concentration, difficulty speaking, visual disturbances, and psychomotor (Rustanti, 2011).

Levels of lead in the blood are an indicator of exposure that is often used in conjunction with external exposure. Levels of lead in the blood can be an indication of the actual amount of lead directly into the body. Thus to determine and measure the lead levels in the human body can be seen through the blood, sekreta, soft tissue, and tissue minerals (Naria, 2005).

A study in Surabaya conducted on blood lead levels of traffic police to wear a mask while on duty compared to the police who did not wear a mask. Of the 24 police officers on duty at the intersection congested with traffic, gained the lead content in the blood of 31.6 mg/100 mL, whereas that does not wear a mask with an average of 49.2mg/100 mL of blood. (Wahyudiono 2006)

Dellyani (2010) in his research stating that Pb exposure by inhalation which lasted for 30 days can cause damage to the kidney proximal tubule Balb/c mice microscopically, in the form of narrowing and closing the lumen of the proximal tubule in group P1, P2, P3 compared with treatment group control ($p < 0.05$).

The research aimed to analyze the effects of blood lead, smoking habits and nutritional status of the serum cystatin C.

2. RESEARCH METHODS

This research is a field with an observational design using cross-sectional approach, where all the variables are

measured at a same time, as well as data analysis includes descriptive and analytic analysis and carried in car painting workshop in Surabaya with design painting space enclosed and air holes Inadequate this is seen in the initial survey undertaken researcher and the study was conducted during February till April 2015

The population in this study consisted of population groups exposed and unexposed groups. The group is not exposed administrative workers by 44 people. Workers exposed group is part of painting the car by 19 people. Technique data collecting by interview by using questionnaire on smoking habits and take measurements of height and weight using mikrotoa to determine the nutritional status of workers and make observations about the administrative area of the room and the garage, ventilation, lighting, and blood sampling were performed by Laboratory parties represented by health analysts, then from blood samples is carried out an analysis of blood lead and serum levels of Cystatin C, samples taken have met the inclusion criteria, namely Male, Not have a history of diabetes mellitus, was never exposed to chronic kidney disease before in Thank working, working period> 5 years, and not using PPE.

Overall the data collected is of primary data, ie the data directly collected by researchers such as nutritional status data using the scales and height measuring device that is mikrotoa as measured by the way, calculation of body mass index (BMI) = BB/SO 2 and measure the area of the room, ventilation, and blood sampling. Later in the analysis using multiple linear regressions using the data processing program.

Blood lead was measured in a manner that is, the first by 5 mL blood sample is inserted into a porcelain cup that has been previously weighed, then added 5 mL of concentrated nitric acid and ashing acid (a mixture of 25 g of potassium sulphate with 100 mL of concentrated nitric acid). Then heated in a furnace at a temperature of 4000C, to obtain a white powder, then added with as many as 10 mL of distilled water, then reheated over and over again until exhausted nitrate acid. The content of lead in the blood can be read using AAS.

Serum cystatin C inspection is an examination of quantitative sandwich enzyme immunoaAASy. Monoclonal antibodies specific for CysC previously coated microplate to. Standards and samples pipetted into the well if there CysC it will be bound by the antibody. After washing unbound substances, an enzyme-specific monoclonal antibody binding/enzyme-linked monoclonal antibody specific for CysC added to the well. Then performed again washing to get rid of antibody-enzyme reagent does not bind, then substrate solution added to the well and the color formed proportionally shows the number CysC bonded at an early stage. Color formation was stopped and the color intensity is checked

3. RESULTS AND DISCUSSION

Examination of blood Pb levels using AAS method. At low concentrations, blood Pb examination is more sensitive than Pb in urine. Standard exposure to Pb in the blood up to 10 ug/dl (WHO). Distribution of blood lead levels among respondents is shown in Table 1.

Table 1 Distribution of the frequency of respondents by the blood Pb levels of car painting workers in Surabaya in 2015

Blood Pb Levels (µg/dl)	Group				Totaly	
	Exposure		Not Exposure		n	%
	n	%	n	%		
≤10	5	41.67	10	83.33	15	62.5
>10	7	58.33	2	16.67	9	37.5
Total	12	100	12	100	24	100
Means (SD)	11,20 (1,66)		8,25 (1,92)			

Based on this research, it is known that the blood lead levels of workers who are in the painting is higher in comparison with workers who are in administration this is evidenced by the average number of exposed groups of 11.20 mg / dl whereas in the group not exposed to only 8 , 25 ug/dl and 7 of the exposed group had blood lead levels that exceed the standard value that has been set by the WHO is 10 mg / dl while in the group not exposed to only two of the 12 who had a blood lead exceeding the threshold value that has been set by WHO and by Palar, 2012 stating that the air Pb responsible for the increase in blood lead in the group that this is due to exposure to Pb in the air that can enter the blood first through the respiratory tract, skin and ingestion which would then accumulate 95% to blood.

Table 2. The frequency distribution of respondents by serum levels of Cystatin C car painting workers in Surabaya in 2015

Cystatin C serum Levels (mg/L)	Group				Totaly	
	Exposure		Not Exposure		n	%
	n	%	n	%		
<0,53	-	-	-	-	-	-
0,53-1,01	4	33.33	10	83.33	14	58.33
>1,01	8	66.67	2	16.67	10	41.67
Totaly	12	100,0	12	100,0	24	100,0
Means (SD)	1,08 (0,13)		0,84 (0,14)			

Based on the results of this study showed that levels of Cystatin C in workers who are in part pengecata Cystatin possess higher levels when compared to workers who are in administration as evidenced mean Cystatin C levels higher worker painting section is 1,08 mg/L while Cystatin C levels mean workers who are in the administration of only 0.84 mg/L and turned out as many as 8 people in the exposed group had higher levels of Cystatin C which exceeds the predetermined value is> 0,53-1,01 mg/L.

Effect of blood lead levels, smoking habits, and nutritional status of the serum cystatin C were analyzed using linear regression test with the following results.

Table 3. Effect of Effect of blood lead levels, smoking habits, and nutritional status of the serum cystatin C

	Cystatin C serum	
	B	P
Blood Lead	0.374	0.044
Smoking Habits	-0.265	0.164
Nutritional Status	0.604	0.001

**p<0,01 (Significant) *p<0,05 (significant)

According to the table 1 is known that there is influence between blood lead levels and nutritional status and serum levels of Cystatin C with Pb influence on serum cystatin C (β = 0.374; p = 0.044), and the effect of nutritional status on serum cystatin C (β = 0.604; p = 0.001) Thus it can be seen that the higher the blood lead levels, the higher the levels of Cystatin C in serum and the more the higher the body mass index or an increased risk for obese then the higher the levels of Cystatin C.

This is consistent with the theory that lead excretion processes that take place in the kidney may cause adverse effects to the kidney itself. This is in line with research conducted by Dellyani (2010), study results showed that proximal tubular damage significantly different in the groups P1, P2, P3 compared to the control treatment group (p <0.05).

According to Palar 2012, turns lead into the blood would have excreted through the kidneys so that there is some remaining residual excretion in the kidney which then accumulate in chronic, it is this which can cause damage to the proximal tubules which will further increase serum cystatin C as a marker effective to see kidney damage. It is also supported by the statement Mukono, 2010 which states that the kidneys have a higher capacity for binding chemicals, one of which is reciprocal, so that more chemicals contained in the kidneys compared to other organs that exist in the body. It is also supported by Schnellman 2010, although kidney weight is only about 0.5% total body weight of the human body but the kidney is an organ that is able to receive blood by 20% -25% of the flow of blood pumped by the heart that taste of the renal artery terms This has led to high blood flow to the kidneys can cause a wide variety of chemicals can be entrained into the kidney so that substances that are toxic it can accumulate in the kidneys and cause damage to the kidney itself and it is part of the proximal tubule kidney organ most frequently damage due to exposure to nephrotoxic agents. Predisposing factors resulting in proximal tubular cells are easily damaged is the role of proximal tubules were reabsorbing 60% -80% of the glomerular filtration.

Based on the results of this study indicate that there is influence between nutritional status with serum levels of Cystatin C (β = 0.604; p = 0.001) this line with research conducted by Ridwan et al, the results showed that there are different levels of Cystatin C between adolescent obesity and normoweight where Cystatin C levels in obese adolescents is higher than teenagers normoweight (0.80 ± 0.11 mg / L vs 0.72 ± 0.11 mg / L, p = 0.014). There are differences between adolescent obesity eGFR and eGFR normoweight where adolescent obesity is lower than teenagers normoweight (104.88 ± 17.48 ml / min / 1,73² vs 121.95 ± 23.67 ml / min / 1,73², p = 0.007). There is a positive correlation between BMI with Cystatin C levels (p = 0.012, r = 0.332), the higher the BMI the higher the levels of Cystatin C. There is a positive correlation between the levels of Cystatin waist circumference (p = 0.004, r = 0.390), higher waist circumference higher the levels of Cystatin C. Compared to BMI, waist circumference has the greatest correlation to increased levels of cystatin C. Cystatin C is concluded that the levels of obesity in adolescents is higher than teenagers normoweight.

There are differences in the levels of Cystatin C significantly between groups of obese, overweight and control groups either in Male or Female Cystatin C levels are higher in obese than overweight group and the control group. In the group of obese based on BMI can be determined that adiposity not only serves as a place for storage triacyglycerol, but also able to produce and secrete a number of proteins one of which is Cystatin C which affect various physiological processes (Bashir, et al 2010).

Nurbaya et al, 2010 in the research states that workers with better nutritional status have greater levels of Pb with a value of p = 0.001. Naour (2009) in his research on the subject of obesity (BMI: 34.7 ± 0.29 kg / m²) found that levels of Cystatin C is increased in obesity. Cystatin C mRNA expressed in the subcutaneous tissue and adipose omental two-fold higher than the non adipose tissue. This increase can arise from enlarged adipocytes or from SVF cells including macrophages expressing Cystatin C mRNA and infiltrate the adipose tissue. They concluded that the Cystatin C adds to the list of new factors bioactive molecules secreted by adipose tissue to the implications of obesity and obesity-related complications. In studies of the adult population who suffer from overweight and obesity in the United States by Muntner et al (2008), also found a strong relationship between BMI with increased levels of Cystatin C as a biomarker ESRD.

Obesity groups more at risk of renal impairment compared normoweight group. Increased risk of Early Stage Renal Disease (ESRD) on a high BMI and obesity is five times higher than people with normal weight. Visceral fat, insulin resistance and inflammation correlated with the occurrence of CKD and ESRD in obesity (Zoccali, 2010). Previous research at the University of California, San Francisco also found that there is a strong relationship between obesity and the occurrence of CKD or ESRD trip. They concludes that the risk of kidney failure in overweight respondents almost two times greater than normal weight respondents and respondents were obese with a BMI of 40 kg / m² or more have a seven times greater risk of suffering from kidney failure

4. CONCLUSION

Blood lead levels higher in the exposed group with a mean of 11.20 ppm in comparison with the group that was not exposed to 8.25 ppm, and levels of serum cystatin C in the group exposed to larger with a mean of 1.08 and 0.84 and unexposed groups based analysis Data obtained results of serum cystatin C is influenced by blood Lead levels and nutritional status while smoking does not affect the serum cystatin C to workers in the painting workshop

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