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Analysis of air pollutant exposure toward the breathing function of gas station employees in Malang Raya

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Abstract

Background: Air pollution could affect health. The amount of air pollutants in the environment absorbed by the body depends on how long a person is exposed. **Purpose**: This study aims to analyze exposure to air pollutants to gas station employees' respiratory function in Malang. **Methods:** The design of this study was an analytic description with a cross-sectional approach. The sample size was 103 consisting of employees as operators and non-operators. The sampling technique was purposive sampling. The study was conducted in September - October 2018. **Result**: The results of the study were analyzed by the Cramer and Kendall Correlation test. The results were 1) there was no correlation between the length of work and the inspirational capacity of both operator and non-operator 2) there was no correlation between the duration of work and the flow peak expiration for both operator and non-operator employees 3) there is no correlation between length of employment with hemoglobin both on the operator and non-operator employees 4) there is a correlation between the size of work with oxygen saturation on operator employees 5) there is no correlation between length of employment with oxygen saturation on non-operator employees. **Conclusion:** It is further research to use digital spirometer and peak flow meter devices to get more accurate results.

Keywords: air pollution, peak expiration flow, hemoglobin, oxygen saturation, employee of gas station

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INTRODUCTION

The quality of human life on earth depends on the quality of the environment. If the climate is good and maintained, life quality will also be supported (Fawole et al., 2016). Long-term exposure to air pollution can trigger several chronic diseases such as lung cancer, blood cancer, stroke, heart disease, and various other diseases. The amount of air pollutants in the environment absorbed by the body depends on how long a person is exposed, which can be in minutes, duration of exposure, even concentration from exposure (Lakey et al., 2016). Among particles of fast air pollutants bind with hemoglobin with concentrations greater than oxygen. Air pollution from toxic materials is one of the health problems in the world. Indonesia is one of the countries with high air pollution levels, about 70% of which are health problems in increased air pollution areas such as Jakarta, Medan, Batam, and Solo (Faisal and Susanto, 2017).

With urbanization and the rapid increase in the number of vehicles in some major cities, air pollution will also increase. This is due to the use of gasoline as the primary fuel in motorized vehicles. The effects of motor vehicle emissions are a big problem. Exposure to gas (petroleum) and exhaust causes health problems that can reduce lung ability. Benzene is absorbed through digestion, inhalation, and skin application. Experimental data shows that humans can absorb up to 80% of inhaled benzene (after 5 minutes of exposure). Inhaled is the most likely route from exposure to chemicals, especially in the workplace.

Gas station workers are groups of workers who play an essential role in helping service and providing fuel for public transportation. However, this officer also has the risk of being exposed to hazardous chemicals, especially lead from gasoline and gas emissions of motor vehicles waiting for a refueling queue or a vehicle that will depart after refueling. The gas station position near the highway makes it easier for officers to be exposed to lead pollutants from the smoke of cars traveling on the road. Employees of gas stations, especially operator officers on filling points (filling point), are working for populations with a high risk of benzene exposure, primarily through inhalation pathways during continuous exposure times. ATSDR (2007) estimated that the average benzene exposure to workers at the

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gas station area was 0.122 ppm so that the impact of the pollution could disrupt the respiratory system (Junaidi, 2019).

The respiratory system's response to exposure to harmful gases and particles, which are not successfully removed through the clearance of mycosiliaries and immune cells, can be delivered in several ways. Changes observed in the lungs due to inhalation of gases and harmful particles will depend on the concentration of the material inhaled, the duration of exposure, and their chemical properties (Chen et al., 2019). The respiratory system's effects reported by workers exposed to benzene are 80% of mucous membrane irritation and complain of congestion as much as 67% for those who work more than 60 ppm for three weeks. Also reported are acute tracheitis, laryngitis, bronchitis, and massive autopsy in the lung due to benzene poisoning (Laskar et al., 2020). Benzene can cause problems in the blood; a person who breathes in a long period may disrupt the formation of blood cells, especially in bone cells, so that the effect on the component of blood causes anemia, bleeding, threatens the immune system, and increases infection and decreases the body's resistance fight cancer (Hakim et al., 2017). Based on the background description, the research problem can be formulated as follows, "What is the Analysis of Exposure of Air Pollutants to Respiratory Functions in Gas Station Employees in the Malang Region? ".

METHOD

The design of this study is descriptive-analytic with a Cross-Sectional approach. The research sample is employees who work at gas stations in the Greater Malang region. The sample size of 103 people consisted of 73 people and non-operators of 30 people. Inclusion criteria are: respondents work at gas stations at least three months, at least 18 years of age while exclusion criteria are: unwilling to become respondents, respondents have diseases in the pathways such as pulmonary TB, asthma, and bronchitis. The sampling technique used was purposive sampling. The study was conducted from September to October 2018. Data collection techniques used interviews and observation. Interviews include general identity and data, while statement includes measurement of pulmonary function, which provides for inspiration capacity, peak expiratory flow, hemoglobin level, and oxygen saturation.

RESULT

A. Univariate Analysis

1) Age

Based on **Fig. 1**, distribution of respondents as operators was 32 people (44%) aged between 21 to 30 years, while as non-operators, there were 13 people (43%) aged between 31-40 years.

2) Gender

Based on **Fig. 2**, it can be seen that there were 50 male respondents as operators (68%) and 24 female non-operator respondents (80%).

3) Work

Based on **Fig. 3**, it can be seen that the respondents were 73 people (71%) working as operators, while 27 people (29%) used as non-operators.

4) Work Complaints

Distribution of respondents based on complaints during work as in **Tables 1** and **2**.

Based on **Table 1**, it can be seen that the operators were 13 people (18%) who had short complaints during

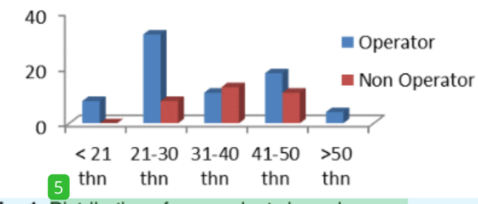

Fig. 1. Distribution of respondents based on age

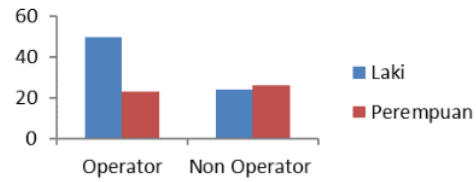

Fig. 2. Respondent Distribution by gender

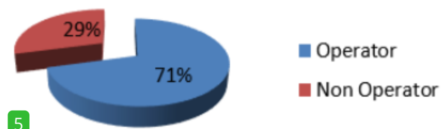

Fig. 3. Distribution of respondents based on types of work

Table 1. Frequency Distribution of Work Complaints of Operators

Operator complaints	< 5 years		5 - 10 years		> 10 years		Total	
	N	%	N	%	N	%	N	%
Dizziness	9	12%	0	0%	2	3%	11	15%
Shortness of breath	8	11%	0	0%	5	7%	13	18%
Nausea	1	1%	1	1%	1	1%	3	4%
Coughing	6	8%	0	0%	0	0%	6	8%
Shortness of breath and nausea	2	3%	0	0%	0	0%	2	3%
Dizziness and nausea	1	1%	0	0%	5	7%	2	3%
No complaint	17	23%	9	12%	10	14%	36	49%
Total	44	60%	10	14%	23	32%	73	100%

Table 2. Frequency Distribution of work Complaints of Non-operator respondents

Non Operator Complaints	< 5 years		5 - 10 years		> 10 years		Total	
	N	%	N	%	N	%	N	%
Dizziness	2	7%	0	0%	3	10%	5	17%
Shortness of breath	2	7%	0	0%	0	0%	2	7%
Nausea	0	0%	1	3%	1	3%	2	7%
No complaint	10	33%	5	17%	6	20%	21	70%
Total	14	47%	6	20%	10	33%	30	100%

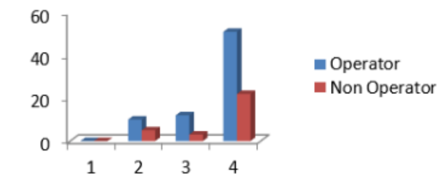

Fig. 4. Distribution of Frequency of Side Dish (Protein) Consumption of Respondents

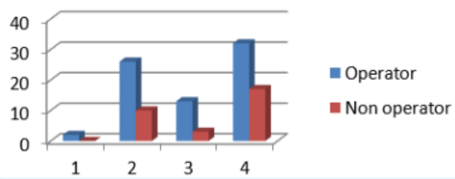

Fig. 5. Frequency Distribution of Vegetable Consumption of Respondents

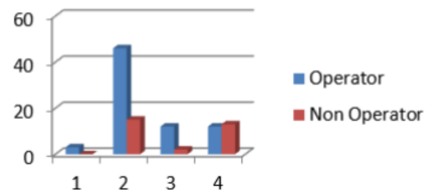

Fig. 6. Respondents' Frequency Distribution of Fruit Consumption

work while those who complained were as many as 11 people (15%).

Based on **Table 2**, it can be seen that there were 5 non-operator respondents (17%) who have dizziness complaints.

5) Consumption of side dishes

Distribution of respondents based on the consumption of side dishes as shown in **Fig. 4**.

Based on **Fig. 4**, it can be seen that the operator respondents who always consume protein side dishes were as many as 51 people (70%) while non-operator respondents were as many as 22 people (73%).

6) Vegetable consumption

Distribution of respondents based on vegetable consumption as shown in **Fig. 5**.

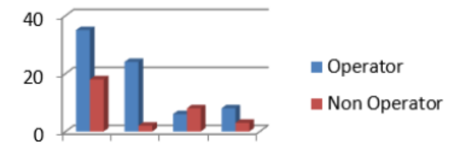

Fig. 7. Frequency Distribution of Sports Activities Respondents

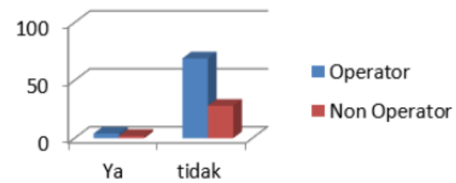

Fig. 8. Distribution of Frequency of Mask Wearing during work

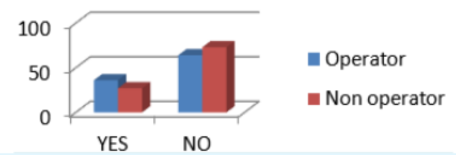

Fig. 9. Smoking habit frequency distribution

Based on **Fig. 5**, it can be seen that the operator respondents who consumed vegetables were 32 people (44%) while the non-operator respondents were 17 people (57%).

7) Consumption of fruits

Distribution of respondents based on fruit consumption as shown in **Fig. 6**.

Based on **Fig. 6**, it can be seen that operator respondents who sometimes consume fruits were as many as 46 people (63%) while non-operator respondents were as many as 15 people (50%).

8) Sports activities

Distribution of respondents in sports activities as shown in **Fig. 7**.

Based on **Fig. 7**, it can be seen that operator respondents who never do sports activities were 35 people (48%) while non-operator respondents were 12 people (40%).

9) wear masks during work

The distribution of respondents who wear masks during work is shown in **Fig. 8**.

Based on **Fig. 8**, it can be seen that the operator respondents who did not wear masks while working were 69 people (95%) while the non-operator respondents were 28 people (93%).

10) Smoking

Distribution of respondents based on smoking habit is shown in **Fig. 9**.

Table 3. Frequency Distribution of Respondents' Working Hours

Working duration	Operator				Jumlah		Korelasi Cramer	Non-Operator				Total		KoCramer
	Normal		Inadequate					Normal		inadequate				
	N	%	N	%	N	%		N	%	N	%	N	%	
< 5 years	19	26%	20	27%	39	53%		6	20%	6	20%	12	40%	
5 - 10 years	8	11%	4	5%	12	16%		3	10%	5	17%	8	27%	
> 10 years	13	18%	9	12%	22	30%	0,889	6	20%	4	13%	10	33%	0,356
Total	40	55%	33	45%	73	100%		15	50%	15	50%	30	100%	

Table 4. Correlation between length of work with the emotional capacity

Working duration	Operator				Jumlah		Korelasi Cramer	Non-Operator				Total		KoCramer
	Normal		Inadequate					Normal		inadequate				
	N	%	N	%	N	%		N	%	N	%	N	%	
< 5 years	19	26%	20	27%	39	53%		6	20%	6	20%	12	40%	
5 - 10 years	8	11%	4	5%	12	16%		3	10%	5	17%	8	27%	
> 10 years	13	18%	9	12%	22	30%	0,889	6	20%	4	13%	10	33%	0,356
Total	40	55%	33	45%	73	100%		15	50%	15	50%	30	100%	

Table 5. Correlation between Working Time with the score of peak flow

Working duration	Operator				Jumlah		Cramer	Non-Operator				Total		Cramer
	Normal		Inadequate					Normal		Inadequate				
	N	%	N	%	N	%		N	%	N	%	N	%	
< 5 years	26	36%	13	18%	39	53%		8	27%	4	13%	12	40%	
5 - 10 years	5	7%	7	10%	12	16%		4	13%	4	13%	8	27%	
> 10 years	11	15%	11	15%	22	30%	0,221	5	17%	5	17%	10	33%	0,406
Total	42	58%	31	42%	73	100%		17	57%	13	43%	30	100%	

Table 6. Correlation between the time of work and hemoglobin

	Operator				Total		Control test	Non Operator				Total		Control test
	Normal		Inadequate					Normal		Inadequate				
	N	%	N	%	N	%		N	%	N	%	N	%	
<5 years	37	51%	2	3%	39	53%		10	33%	2	7%	12	40%	
5 - 10 years	11	15%	1	1%	12	16%		7	23%	1	3%	8	27%	
> 10 years	16	22%	6	8%	22	30%	0,000	8	27%	2	7%	10	33%	0,138
Total	64	88%	9	12%	73	100%		25	83%	5	17%	30	100%	

Based on **Fig. 9**, it can be seen that the operator respondents who smoked were 26 people (36%) while the non-operator respondents were eight people (27%).

11) Working duration at the gas station

The distribution of respondents based on the length of work at gas stations is shown in **Table 3**.

Based on **Table 3**, it can be seen that 39 respondents (37.8%) have a working period of fewer than five years as an operator, while 12 people (11.7%) have 5-10 years of work as non operators.

B Bivariate Analysis

Bivariate analysis on the results of this study is the length of employment correlation as operator and non-operator respondents with inspiration capacity, peak expiratory flow, hemoglobin, and oxygen saturation.

1) Correlation between working time with the inspirational capacity

Based on **Table 4**, it can be seen that the operator respondents have a less inspirational capacity of (33 people or 45%) compared to 15 non-operator respondents (50%). From the results of the Cramer Correlation test on operator respondents, the results of pv = 0.889 (α <0.05) means that there is no correlation between the length of work and the inspiration capacity, while the results of the non-operator respondents PV = 0.356 (α <0.05) means no there is a correlation between the length of work and inspiration.

2) Correlation between Working Time and Peak Expiration Flow (Peak Flow Rate)

Based on **Table 5**, it can be seen that the 31 operator respondents have less peak current score of (42%), while the non-operator respondents with less height flow were13 people (43%). From the results of the Cramer Correlation test on operator respondents, the results of pv = 0.221 (α <0.05) means that there is no correlation between the length of work with peak expiratory flow, whereas in non-operator respondents the results are pv = 0.406 (α <0.05) meaning there was no correlation between size of work with peak expiratory flow.

3) Correlation between duration of Work with Hemoglobin

Based on **Table 6**, it can be concluded that operator respondents who have abnormal hemoglobin numbers were as many as 19 people (26%), while non-operators who have strange hemoglobin number were as many as 11 people (37%). From the results of the Cramer Correlation test on operator respondents, the results showed pv = 0.79 (α <0.05) means that there is no correlation between the length of work with hemoglobin, whereas in the non operator respondents the results were pv = 0.161 (α <0.05) meaning there is no

Table 7. Correlation between the time of work and hemoglobin

Working duration	Operator Hemoglobin			Korelasi Cramer	Non-Operator Hemoglobin			Korelasi Cramer
	Normal	Inadequate	Total		Normal	Inadequate	Total	
< 5 years	27 (37 %)	12 (16 %)	39 (53 %)	0,79	7 (23 %)	5 (17 %)	12 (40 %)	0,161
5 - 10 years	7 (10 %)	5 (7 %)	12 (16 %)		5 (17 %)	3 (10 %)	8 (27 %)	
> 10 years	20 (27 %)	2 (3 %)	22 (30 %)		7 (23 %)	3 (10 %)	10 (33 %)	
Total	54 (74 %)	19 (26 %)	73 (100 %)		19 (63 %)	11 (37 %)	30 (100 %)	

correlation between the duration of work with hemoglobin.

4) Correlation between duration of Work with Oxygen Saturation

Based on **Table 7**, it can be concluded that the 9 operator respondents had less oxygen saturation values (12%), while the non operators that had less oxygen saturation values were 5 people (17%). From the results of the Kendall Correlation test on operator respondents, the results of pv = 0,000 (α <0.05) means that there is a correlation between the duration of work and oxygen saturation, while the non operator respondents get pv = 0.138 (α <0.05) meaning there is no the correlation between duration of work and oxygen saturation.

DISCUSSION

1) Inspiring capacity

The results of the research on operator respondents according to **Table 7** show that the inspirational capacity in the category is as low as 33 people (45%), as well as the non operator respondents the inspirational capacity in the category is less than 50%. From the results of the Cramer Correlation test on operator respondents, the results of pv = 0.889 (α <0.05) means that there is no correlation between the duration of work and the inspiration capacity, whereas in the non operator respondents the results are pv = 0.356 (α <0.05) meaning there is no correlation between the duration of work and inspiration.

In accordance with the 2007 ATSDR theory, benzene can enter the human body through breathing, gastrointestinal and skin. When inhaling bensena in the air, 50% goes into the lungs and blood. Benzene exposure affects the CNS and hematopoietic system and can affect the immune system. Death due to exposure to acute benzene is caused by shortness of breath, respiratory attacks, CNS depression, or cardiac dysrhythmias (Chao et al., 2020). Pathological findings in fatal cases include inflammation of the respiratory tract, pulmonary bleeding, kidney congestion, and cerebral edema. The existence of complaints of shortness of breath due to exposure to benzene is likely to change the structure and function of the lung decreases so that the lung's ability to expand maximally decreases (Bourdrel et al., 2017).

The results of the statistics show that there is indeed no correlation between the length of work of the respondent operator and the non operator to the inspirational capacity, but the fact shows that the respondent has a problem in the inspirational capacity of less than 45% in the operator respondents and 50% in the non operator respondents. This shows that there is a possibility of problems in respiratory function in the form of a decrease in the ability of the lung to breathe and develop the chest so that the inspiration capacity decreases (Lakey et al., 2016).

The results also showed that the poor inspirational capacity of the operator and non-operator respondents was dominated by respondents who worked less than 5 years, this is probably due to the initial response to body adaptation, especially respiratory function, both the airway and lung due to exposure to pollutants (Gao et al., 2018).

Factors that can influence the results of the research above are 1) age factor, age of respondents as many as 34 people (33%) aged over 40 years. The older the respiratory function in this case the inspiration capacity will decrease. 2) respondents' smoking habits, from the results of the study showed respondents who smoke as much as 36% and non-operator respondents as much as 27%. Substances that are in cigarettes will affect body cells in the airway and in the lungs that interfere with respiratory function. 3) sports activity factors, the results of the study showed that 47 people (45.6%) never did exercise, this would affect the ability of the lungs in the ventilation process so that the work of the lungs would decrease. 4) factors wearing masks while working, respondents who did not wear masks while working were 94%. This is likely to strengthen the lungs and other functions exposed to pollutants that are not only benzene but also other substances that are around the gas station (Xu et al., 2018).

2) Expiration Peak

Based on the results of the research according to **Table 4**, the results show that the respondents as operators experienced a value of as many as 31 people (42%) while the non-operator respondents were 13 people (43%). From the results of the Cramer Correlation test on operator respondents, the results of pv = 0.221 (α <0.05) means that there is no correlation between the duration of work with peak expiratory flow, whereas in non operator respondents the results of pv = 0.406 (α <0.05) mean there was no correlation between duration of work with peak expiratory flow.

These results indicate that both operators and non operators who work at gas stations have nearly half the peak expiratory flow value which means that there is an impact on people working in the gas station environment against the value of peak expiratory flow. Examination of peak expiratory flow aims to objectively measure air currents in large airways so that it can be used to determine the increase in airway resistance which provides an overview of airway obstruction. This is also an early warning of a decrease in lung function. The value of the peak expiratory flow which decreases in respondents who work in gas stations both as operators and non operators indicates a presence of airway obstruction so that the lungs cannot develop optimally, which results in a decrease in the value of peak expiratory flow. The predictive value of APE is obtained based on age, height, gender and race. Indonesian PEFR predictive value Based on the results of the 1992 Indonesian Pneumobile Project Team research (Boudaghpour, 2011).

However, statistically the relationship between the duration of respondent's work to peak expiratory flow was obtained that there was no significant correlation between the work duration of the gas station respondents towards peak expiratory flows, both operator and non operator respondents. Although there was a lack of impact on respondents to peak expiratory flow, there was not enough statistical evidence. The results of the study found that the respondents who were most affected by pollutants were those who worked less than 5 years. Other factors that can influence the results of this study are the same as in the inspiration capacity section (Garcia-gonzales et al., 2019).

3) Hemoglobine

Based on the results of the study according to **Table 6** the results showed that the respondents as operators experienced a less hemoglobin value of 19 people (26%) while the non-operator respondents were 11 people (37%). From the results of the Cramer Correlation test on operator respondents, the results of pv = 0.79 (α <0.05) means that there is no correlation between the length of work with hemoglobin, whereas in non operator respondents the results of pv = 0.161 (α <0.05) mean there is no correlation between the duration of work with hemoglobin.

In accordance with the theory, benzene is one of the additives in gasoline, benzene increases the octane number of gasoline and gasoline contains several percent benzene in it. Benzene exposure affects the CNS and hematopoietic system and can affect the immune system. Death due to exposure to acute benzene is caused by shortness of breath, respiratory attacks, CNS depression, or cardiac dysrhythmias. Pathological findings in fatal cases include inflammation of the respiratory tract, pulmonary bleeding, kidney congestion, and cerebral edema (Kartikasari, 2020).

Benzene can also cause dangerous hematological toxicity such as anemia, leukopenia, thrombocytopenia, or pancytopenia after chronic exposure. This effect is believed to be caused by benzene metabolites, which are most likely to damage the DNA of pluripotential stem cells. All blood components (i.e. erythrocytes, leukocytes and platelets) can be affected at various levels. Accelerated destruction or reduction in the third number of the main types of blood cells is called pancytopenia. But statistically the results of this study contradict the above theory, namely there is no correlation between both operator and non operator respondents to hemoglobin. Although there was no correlation, there were respondents who probably had less hemoglobin values due to exposure to benzene pollutants. The data from the research results as in **Table 5** show that respondents who received less hemoglobin values occurred in respondents who worked less than 5 years compared to those who were more than 5 years old (Hakim et al., 2017).

According to Sherwood (2001) Hemoglobin is an iron-containing protein molecule that has the ability to form loosely reversible bonds with O_2. Besides binding to O_2, hemoglobin can also bind to CO, and Hb's affinity for CO is 240 times stronger than the strength of Hb and O_2 bonds (Suwondo et al., 2018).

According to WHO (1992) in Suyono (2018), 90% of CO gas is produced by motorized vehicle exhaust, the impact of losses on material is relatively small but the health is quite significant. Levels of CO exposure to the body starting from 30 ppm for 8 hours can cause dizziness and nausea. This is in accordance with the results of the study as in **Table 1** SPBU respondents who complained of dizziness by 15%, nausea as much as 4%.

According to Suyono (2018) air pollution can be caused by Sulfur Dioxide (SO_2), Carbon monoxide (CO), Carbon dioxide (CO_2), Nitrogen oxide (NO_x), Nitrogen dioxide (NO_2), Oxidants, Ozone, Peroxyatylnitrate, Hydrocarbons (HC or CH), Chlorine (Cl_2), dust particles, noise and lead lead (Pb). According to the Decree of the Director General of Oil and Earth, fuel oil in motorized vehicles contains lead. The lead content at the maximum limit premium is 0.013 gr / lt, in the fuel type pertamax the lead content (Pb) has a maximum limit of 0.013 gr / lt, sulfur is 0.05% m / m, benzene is 5.0% v / v, while in pertalite type, lead content (Pb) does not exist, maximum sulfur is 0.05% m / m.

According to the Journal of Community Medicine and Public Healt (2017), which states that exposure to lead entering the air by around 30-40% will be absorbed into the blood. In blood lead will inhibit heme synthesis by binding to the thiol group on the enzyme Aminoluvucinic Acid Dehydrase. Lead will also damage antioxidant enzymes such as Superoxide dismutase (SOD), Catalase (CAT), and Gluthation Peroxidase (GPx) which results in uncontrolled formation of free radical compounds in the form of Reactive Oxygen Species (ROS). The imbalance between many free radicals and antioxidants causes oxidative stress to occur which is related to damage to cell membranes, DNA, RNA and damage to brain cells (Sundari, 2019).

Oxygen saturation

Based on the results of the study in accordance with **Table 7**, the results showed that the respondents as operators who had less oxygen saturation values were nine people (12%) while those in the non operator respondents were 5 people (17%). From the results of the Kendall Correlation test on operator respondents, the results of pv = 0,000 (α <0.05) means that there is a correlation between the duration of work and oxygen saturation, whereas in non operator respondents the results are pv = 0.138 (α <0.05) which means there is no correlation between duration of work and oxygen saturation.

In operator respondents, a decrease in oxygen saturation can be caused by exposure to benzene and air pollutants around gas stations. Benzene is an additive in gasoline and benzene exposure affects the CNS and hematopoietic system and can affect the immune system. Death due to exposure to acute benzene is caused by shortness of breath, respiratory attacks, CNS depression, or cardiac dysrhythmias. Benzene can also cause dangerous hematological toxicity such as anemia, leukopenia, thrombocytopenia, or pancytopenia after chronic exposure. This effect is believed to be caused by benzene metabolites, which are most likely to damage the DNA of pluripotential stem cells. All blood components (i.e. erythrocytes, leukocytes and platelets) can be affected at various levels. Accelerated destruction or reduction in the third number of the main types of blood cells is called pancytopenia (Junaidi, 2019).

The damage from the erythrocytes decreases the hemoglobin in the body so that the oxygen bound by hemoglobin also decreases, it can cause hypoxia or lack of oxygen in the cell. The existence of hypoxia will affect and disrupt the body's metabolic functions so that the body's mechanism to meet the amount of oxygen that enters the lungs by increasing the amount of respiration so that the person complains of shortness of breath (Andryani, 2019).

Another dominant factor in the gas station area is pollution by carbon monoxide (CO). Carbonmonoxide interferes with human health when reacting with hemoglobin in red blood cells, approximately 220 times faster than the oxygen inhaled. The impact of this faster CO bond will reduce the Hb-O2 bond and in the end the body's oxygen saturation value will decrease (Yunazwardi, 2020). However, this is also influenced by the amount of hemoglobin in the blood and the strength of the heart pumping to supply oxygen (Sari et al., 2020).

According to Suyono (2018), air pollution can be caused by the presence of lead (Pb) especially around the gas station. The impact of the Pb reaction with the sulfhydryl group of proteins will cause protein deposition and inhibit the production of hemoglobin. As a result of hemoglobin that falls will cause a decrease in binding to oxygen, which results in a decrease in oxygen in the tissues or cells. This can cause complaints such as shortness of breath, dizziness, decreased appetite. Symptoms of chronic poisoning due to Pb include loss of appetite, constipation, fatigue, headache, anemia, limb paralysis, seizures and vision problems (Faisal and Susanto, 2017).

The theory above is in accordance with the results of research that respondents as operators who complain of congestion as many as 13 people (18%), dizziness complaints as many as 11 people (15%), cough complaints as many as 6 people (8%). Whereas in non operator respondents, the most prominent complaints were dizziness by 5 people (17%) while shortness and nausea complaints were 2 people (7%). Complaints about these complaints can be caused by a decrease in oxygen saturation (Kartikasari, 2020).

CONCLUSION

The conclusions of this study are a) The inspirational capacity of the operator respondents who scored less than 45% and the highest number who worked less than 5 years, while the non-operator respondents scored less than 50% and the highest number worked less than 5 years, b) Cramer Correlation Test of operator and non operator respondents respectively obtained pv = 0.889 and pv = 0.356 (α <0.05) meaning that there is no correlation between the duration of work and inspiration capacity. c) Peak expiratory flow of operator respondents who scored less than 42% and the highest number who worked less than 5 years, while non-operator respondents who scored less than 43% and the highest number who worked more than 10 years. d) Cramer Correlation Test of operator respondents and non-foreign operators obtained pv = 0.221 and pv = 0.406 (α <0.05), meaning that there is no correlation between duration of work and peak expiration. e) Hemoglobin operator respondents who scored less than 26% and the highest number worked less than 5 years, while non-operator respondents who scored less 37% and the highest number occurred in non operators who worked less than 5 years. f) Cramer Correlation Test on operator and non operator employees respectively obtained pv = 0.79 and pv = 0.161 (α <0.05) meaning that there is no correlation between the duration of work with hemoglobin. g) Oxygen saturation of operator respondents who scored less than 12% and the highest number worked more than 10 years, while non-operator respondents scored less than 17% and the highest number worked less than 5 years and more than 10 years. h) Kendall Correlation Test on operator employees obtained pv = 0,000 (α <0,05) means that there is a correlation between the duration of work and oxygen saturation, whereas for non-operator employees the results are pv = 0,138 (α <0,05) meaning there is no the relationship between length of work and oxygen saturation.

Recommendations that can be derived from this study are a) For operators and non-operator respondents, they need to increase inspiration capacity, peak expiratory flow, hemoglobin and oxygen saturation through regular deep breathing exercises at least 2 times a day for 10-15 minutes, exercise regularly at least 3 times a week with a minimum duration of 30 minutes, wearing a mask while working, stopping smoking and knowing cigarette smoke, increasing nutrient intake, especially foods that contain protein. b) For Gas Station Managers, they need to make policies and rules that regulate respondents to reduce exposure to air pollution by using a mask, the engine is turned off when refueling, sports together and so on, there needs to be an increase in endurance such as nutritional nutrition, adequate rest for employees, it is necessary to reforest the gas station area to reduce air pollution. It is further research to use digital spirometer and peak flow meter devices to get more accurate results.

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