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Factors Related To Cohb Content toward Parking Officer of Plaza X Surabaya

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Abstract:- *The aim of thisresearchwas to study the effect of riskfactorsincludesage, gender, workinglives, body position whileworking, smoking habit, blood type, nutrientstatus, level of Hb, to COHblevelsblood in parking officersat X Plaza Surabaya. This researchwas an analyticobservationalstudywhichconducted cross sectional, using simple randomsamplingtechnique. The sample for thisresearchused 30 people.Themeasurement of carbonmonoxide air concentration at parking plaza x conducted on three-point surroundingofficerswork area. COHbcorrelationwithage, workingperiod, Hb, were analyzed usedPearsoncorrelation.The correlationbetweengender, smoking habit and body position whileworking to blood COHBlevelused T sampleanalyzed. The correlationbetweenblood types and bloodCOHblevelwasanalyzedbyanalysis of variance / ANOVA.The Spearman test was used to analyzed thenutritionalstatus. The resultshowedthathighestcarbonmonoxidelevelsfound in motorcyclewhich 16.1 ppm. Ambient air quality standard based on PP No. 41 of 1999 is 10 ppm, if wecomparedwith the resultweconcludethatlevels of CO at parking motor has exceeded the threshold. Based on thisresearch, advised to provide more local exhaust or air conditioning system aroundworking places of parking officers to reduce CO levelwhichproduced by vehicle. Also, weoffer to management handling the parking officers to givevitamin C and vitamin E as antioxidantthatreducetoxic in their body and to give check up facility for health condition regularly.*

Keywords:- Carbon monoxide levels, COHb levels, Parking Attendants

I. INTRODUCTION

Air as an important component of life environment needs to be maintained and provide a quality controlling therefore it provide capacity for organisms living carrying to live optimally. Air is an environment media that is a human basic need to get serious attention. It is also the Indonesia policy of health development 2010 which air pollution control program is one of the flagship programs (Ministry of Health, 2008).

Air pollution as a threat to children's health and the environment is a risk factor for acute respiratory disease or chronic. Smoke of Cigarette pollutants on the environment and outdoor certain known as risk factors for acute respiratory infections, indoor air pollution from organic fuel is a major contributor to disease. One of the content of air pollutants are carbon monoxide (CO), which in the air present in very small amounts, only about 0.1 ppm. In urban areas with heavy traffic CO gas concentration between 10-15 ppm. It has long been known that CO gas in large quantities or low can cause health problems while even cause death. Carbon monoxide in the environment can be formed naturally, but the main source of human activity. Carbon monoxide derived from nature, including from the sea, metal oxidation in the atmosphere, mountains, forest fires and natural electrical storm. Artificial sources of CO include motor vehicles, especially those using gasoline.

Based on estimates, the amount of CO from artificial sources is estimated that nearly 60 million tons per year. Half of this amount comes from a motor vehicle that uses gasoline and third trap is derived from stationary sources such as coal and oil combustion of industrial and domestic waste incineration. In the WHO report (1992) revealed at least 90% of CO in urban air comes from vehicle emissions. In addition, smoke of cigarette also contains CO, so that the smoker can expose himself from smoke of cigarette being inhaled. Sources of CO from the room (indoor) including from household kitchen stove and furnace room.

In some studies, it found that a fairly high level of CO in the sedan vehicles and buses. CO levels in urban areas varies considerably depending on the density of motor vehicles using gasoline and generally found the maximum of CO levels that coincide with the peak hours in the morning and evening. Besides the weather, variations in the levels of CO are also influenced by the topography of the road and the surrounding buildings. Exposure CO from the ambient air can be reflected in the form of levels of carboxy-hemoglobin (HbCO) in the blood formed very slowly because it takes 4-12 hours to achieve a balance between the levels of CO in the air and HbCO in the blood.

Therefore, the levels of CO in the environment are likely to be expressed as average levels within 8 hours of exposure. CO data are expressed in average every 8 hours of measurement all day (8 hours moving average concentration) is better than the CO data expressed in an average of 3 times the measurement period of 8 hours daily. The calculation will be approaching an overview of the human body's response to CO poisoning to the air (Siswanto, 2009).

Carbon monoxide is sourced by the room (indoor) mainly derived from space heaters that use fossil fuels and cooking stoves. Levels will be higher when the room is operated, inadequate ventilation. But generally exposure, from indoor levels is lower than the levels of CO results of exposure to smoke of cigarette. Some individuals may also be exposed to CO because of the work environment. Community groups most exposed to CO including traffic police, car repair shop workers, officers metal industry, industrial gasoline, chemical and gas industry of firefighters. CO exposure of the working environment as mentioned above required some attention (Siswanto, 1994).

The motor vehicles emit harmful substances that can have a negative impact, both on human health and lead to the environment, such as lead (Pb), suspended Particulate Matter (SPM), nitrogen oxides (NOx), Hydrocarbon (HC), carbon monoxide (CO), and photochemical oxidants (Ox). Motor vehicles accounted for nearly 100 percent of lead, 13-14 percent of suspended particular matter (SPM), 71-89 percent of hydrocarbons, NOx and nearly 34-73 percent of the entire carbon monoxide into the air (Yasin, 2006).

The most important biological characteristics of CO are its ability to bind to hemoglobin, the pigment of red blood cells that carry oxygen throughout the body. These properties result in the formation carboxyhemoglobin that 200 times more stable than oxyhemoglobin (HbO2). Slow decomposition COHbimpede the work of the pigment molecules relatively in the function of cells carry out oxygen throughout the body. These conditions can be serious or even fatal as it can cause poisoning (Siswanto, 2009).

In addition, muscle metabolism and function of the intra-cellular enzymes can also be disturbed by the presence of the stable CO bond. Impact of CO poisoning is very dangerous for people who already suffer from disorders of the heart muscle or severe peripheral blood circulation. The impact of CO is vary depends on the person's health status at the time of exposure. In some people who are obese can tolerate exposure to CO levels of COHb in the blood reaches 40% in a short time. But a person suffering from heart disease or lung will become more severe if HbCO levels in the blood by 5-10%. Effect of CO high levels on the central nervous system and cardiovascular system has been widely known. But the response from the community bodied exposure to low levels of CO and in the long term, still little known. For example, the performance of the duty officer, who should have the ability to detect small changes in the environment that occurred at the time that can not be predicted in advance and require a high and constant vigilance, may be interrupted hampered in HbCO levels that are below 10% and even up to 5 % (this is roughly equivalent to the levels of CO in the air, each for 80 and 35 mg / m3) This effect is too visible in smokers, because chances are accustomed exposed to the same levels of smoke of cigarette (Siswanto, 1994).

COHb (carboxyhemoglobin) have higher stability compared with HBO2 (oxyhemoglobin). Affinity between Hb and CO is 250 times more powerful than oxygen. Therefore with such ratios, low levels of CO can be dangerous due to the formation of COHb which reduces blood oxygen transport capacity. Possible of acute exposure will damage to the function of the brain or nervous system and cardiac hypoxia, because these organs lack of oxygen which in turn can lead to death (Budiyono, 2009).

Several studies conducted on a number of volunteers who perform strenuous exercise (study to see maximal oxygen uptake) showed that lost consciousness at COHb levels of 50% with a lighter training, lost consciousness in COHb 70% for 5-60 minutes. The disturbance is not felt in COHb 33%, but the heart rate increases rapidly and disproportionately. Studies in a longer period of time to workers who work for 4 hours with 5-6% COHb levels showed a similar effect on heart rate. The results of the above studies indicate that at least for the non-smokers, there was a linear relationship between COHb and decreasing the maximum capacity of oxygen (Siswanto, 1994).

The effect of CO on the cardiovascular system is quite evident observed although at a lower level. Patients with heart disease and lung disease are among the most sensitive to exposure to CO. Can be known as smoking and increased risk of coronary heart disease showed that CO might have had a role in triggering the onset of the disease (heavy smokers often contain high levels of HbCO to 15%). lack evidence to suggest that carbon monoxide causes heart disease or lung, but it is clear that the CO was able to disrupt the transport of oxygen throughout the body that can have serious repercussions on a person who has suffered from heart disease or lung. Epidemiological studies of morbidity and mortality from heart disease and levels of CO in the air are divided by region, is very difficult to interpret. However chest pain during physical movement, evident will arise in patients exposed to CO at levels of 60 mg / m3, which resulted in approximately around 5% of HbCO levels (Siswanto, 1994).

Plaza as a crowded place with most visitors and parking workers have the habit of smoking, therefore, it has greater risk of exposure to CO. workplace location in an enclosed space plus exposure to CO can cause

occupational diseases. ABO blood group are grouped into this grouping based on the presence or antigens absence on the surface of the red blood cells (erythrocytes) absence, the antigen can be carbohydrates, proteins, glycoproteins, or glycolipids. Carbon monoxide can be produced in small quantities from the catabolism of hemoglobin and other pigments that contain haem and levels of "Endogenous carboxyhaemoglobin" (COHb) in the blood (Siswanto 2009). Based on the above background, the researchers want to determine the factors associated with age, years of smoking, blood type, hemoglobin, body position when working on COHb at the plaza x Surabaya parking attendant.

II. MATERIALSANDMETHODS

This study is an observational analytic study with cross sectional approach. The populations of this study are the entire plaza x South Surabaya parking attendant as many as 45 people. Data were processed using the Pearson correlation test (COHb to analyze the relationship with age, years of service, Hb), free samples of t test (to distinguish gender, body position at work, smoking), ANOVA (different test on blood type variable) and Spearman correlation to analyze the nutritional status.

III. RESULT

III.1. Respondents of characteristik

Tabel3.1.Respondents of characteristic

Variabel	Kategori	total	%
Gender	Laki-laki	22	73,3
	Perempuan	8	26,7
Age	≤40 Tahun	27	90,0
	>40 Tahun	3	10,0
Working Period	≤ 1 Tahun	12	40,0
	> 1 Tahun	18	60,0
Body position at work	Berdiri	18	60,0
	Duduk	12	40,0
Blood Type	O	11	36,7
	A	5	16,7
	B	12	40,0
	AB	2	6,7
HB catagori*	Anemia	6	20,0
	Tidak anemia	24	80,0
Smoking Habits	Ya	18	60,0
	Tidak	12	40,0
IMB categori	Kurus	2	6,7
	Normal	19	63,3
	Gemuk	9	30,0

***Anemia Categori (Labkesda) for men : 13 gr/dl.dan Wanita : 12 gr/dl**

III. 2. Exposure to CO in the blood at workplace

Tabel 3.2. CO levels in the invironment based on the workplace

Workplace location	11 Mei 2013 Hours (WIB)	CO Levels in environment .(ppm)Mean ± Simpanganbaku	12 Mei 2013 Hours (WIB)	CO Levels in environment (ppm)Mean ± Simpanganbaku	Total Mean± simpanganbaku
UG(Motor)	11.05	15,3 ± 0,58	12.05	17,0± 1,00	16,1±0,88
LG	11.15	6,0 ± 1,00	12.20	3,67± 0,58	4,8±1,23
P1	11.35	6,0 ± 1,00	12.35	3,33± 0,58	4,6±1,47
P2	11.50	1,3± 0,58	12.50	2,33± 0,58	1,8±0,55

NAB based (WHO) indoor CO levels is 9 ppm for 8 hours / day

Description: UG: Motorcycle Parking is located on the ground floor vents only at the entrance and exit

LG : Car parking base on located above to the parking of motor and there is the entrance to plaza

P1 : 1st floor of Car parking with no air circulation

P2 :2nd Floor of Car Parking with natural air circulation

Table 3.2 shows the average CO levels in the environment around the plaza parking location x of 8.7 ± 6.4 ppm, with the highest levels in parts of the motor is 16.1 ppm, while in the LG, P1, P2 respectively by 4 , 8; 4.6; 1.8 ppm. The levels of CO in the parking motor has exceeded the threshold (CO levels were allowed to trade in the space according to (WHO, 1994) is 9 ppm and the ambient air quality standard (Regulation No. 41 of 1999) which is 10 ppm).

III.3. CO Levels in blood

Tabel 3.3. the average level of CO in the blood before and after work

Workplace	Total	COHb Before Mean ± SD	COHb After Mean ± SD	COHb difference Mean ± SD
Motor	12	9,654 ± 1,255	10,053 ± 1,369	0,398 ± 0,189
LG	6	8,995 ± 1,513	9,242 ± 1,536	0,247 ± 0,148
P1	6	7,568 ± 1,433	7,728 ± 1,471	0,160 ± 0,103
P2	6	7,728 ± 2,339	7,825 ± 2,407	0,097 ± 0,090
Total	30	8,720 ± 1,773	8,980 ± 1,891	0,260 ± 0,190

Value (p) Significant Anova : (p) : 0,038 (p) : 0,022 (p) : 0,001

Table 3.3 shows the levels of CO in the blood (COHb) workers measured before working was 8.7 ± 1.8%, with the highest levels found in workers who were in the parking of motor (UG) is 9.7 ± 1.3%. COHb levels before working is measured to determine the total previous exposure including levels of CO are produced in the body as a result of catabolism of hemoglobin (Endogenous COHb). Reference COHb in non-smokers is 0.5-0.8%. When compared with a reference to smokers (3-10%), the worker COHb levels exceed the limit of tolerance. Having finished work COHb levels of workers to 9.0 ± 1.9%, an increase of 0.3%.COHbCOHb before and after the work is measured to determine the acute effects of CO exposure when the research environment (COHb after) taking into account previous exposure (COHb before) so that the increase in COHb can be considered as the result of environmental exposure to CO when the study course.

III. 4. Relationship between CO in the environment with COHb

Tabel 3.4.Relationship between CO in the environment with COHb

Variable	corelation			COHbbefore		COHbAfter		differenceCOHb
CO Levels in the environment	Spearman's rho		r_s	0,433		0,441		0,683
			P	0,017*		0,015*		0,000*

Description : corelation signifikan p : < 0,05

Table 3.4 is known that there is a significant correlation between the levels of CO environment with COHb levels before, after working and COHb difference (p = 0.017; p = 0.015; p <0.001). It shows that the increase in COHb is a result of exposure to CO workplace.

III.5. Relationship between gender with COHb Levels

Tabel 3.5. Comparison COHb test resultsbefore and after working based on gender

Gender	Total	COHb before Mean ± SD	COHb After Mean ± SD	COHb difference Mean ± SD
Laki-laki	22	9,420 ± 1,276	9,725 ± 1,378	0,305 ± 0,192
Perempuan	8	6,795 ± 1,538	6,931 ± 1,608	0,136 ± 0,125
Total	30	8,720 ± 1,773	8,980 ± 1,891	0,260 ± 0,190

Nilai (p) Signifikanuji t 2 sampelbebas: (p) : 0,000* (p) : 0,000* (p) : 0,029*

Based on Table 3.5 it can be seen COHb levels before working, after working and COHb difference in men is higher than in women (2 independent samples t test; p <0.001; p <0.001; p = 0.029). There is a relationship between the sexes with COHb levels.

III.6. Relationship between age with COHb Levels

Tabel 3.6. Corelation between age with COHb before , after and difference working

Variable	Corelation		COHb before	COHb after	Difference COHb
age (th)	Pearson	r	0,135	0,118	-0,080
		p	0,478*	0,534*	0,673*
		jml	30	30	30

tabel 3.6 There is a not signiicant between age with COHb levels (p>0,05).

III.7. Relationship between working period with COHb Levels

Tabel 3.7. Corelation between working period with COHb levels before, after and different working

Variable	Corelation		COHb before	COHb after	Difference COHb
Working period	Spearman's rho	r_s	0,053	0,041	0,227
		p	0,781*	0,829*	0,227*
		n	30	30	30

Tabel 3.7 There is not significant correlation between working period with COHb Levels before,after and difference working (p>0,05).

III.8. Relationship between HB Levels with COHb Levels

Tabel 3.8. Correlation between Hb levels with COHb Levels before,after and difference working

Variable	corelation	COHb before		COHb After	differenceCOHb
Hb levels	Pearson	r	0,640	0,644	0,443
		p	0,000*	0,000*	0,014*
		n	30	30	30

Tabel 3.8 There is significant correlation between Hb Levels with COHb Levels in blood (p<0,001; p<0,001; p=0.014).

III.9. Relationship between body position at work with COHb Levels

Tabel 5.9. corelation between COHb levels before and after based on body position at work

Body Position at work	total	COHb before Mean ± SD	COHb after Mean ± SD	COHb diference Mean ± SD
Berdiri	18	8,817 ± 2,027	9,083 ± 2,138	0,266 ± 0,193
Duduk	12	8,574 ± 1,379	8,826 ± 1,526	0,252 ± 0,194
Total	30	8,720 ± 1,773	8,980 ± 1,891	0,260 ± 0,190
Value (p) Significantt test 2 ind sample: (p) : 0,720			**(p) : 0,722**	**(p) : 0,849**

Tabel 3.9 There is a significant between COHb levels with body position at work (p>0,05).

III.10. Corelation between Hubungan antara kebiasaan merokok dengan kadar COHb

Tabel 3.10. difference between COHb levels with smoking habits

Smoking habits	total	COHb before Mean ± SD	COHb after Mean ± SD	COHb difference Mean ± SD
Ya	18	9,503 ± 1,331	9,822 ± 1,426	0,319 ± 0,198
Tidak	12	7,545 ± 1,744	7,717 ± 1,842	0,172 ± 0,143
Total	30	8,720 ± 1,773	8,980 ± 1,891	0,260 ± 0,190
value (p) Significantt test 2 indp sample(p) : 0,002			**(p) : 0,001***	**(p) : 0,035***

Tabel 3.10 There is a significant COHb levels smoker showedhigh levels COHb before, after and difference working compared with non smoker (p=0,002; p=0,001; p=0,035).

III.11. relationship between blood type with COHb levels

Tabel 3.11. comparasi test COHb levels before and after working based on bood type

Blood Type	total	COHb before Mean ± SD	COHb after Mean ± SD	COHb difference Mean ± SD
A	5	9,334 ± 1,750	9,578 ± 1,734	0,244 ± 0,048
B	12	8,404 ± 1,719	8,623 ± 1,863	0,219 ± 0,202
AB	2	7,455 ± 1,747	7,590 ± 1,895	0,135 ± 0,148
O	11	9,015 ± 1,901	9,350 ± 2,033	0,335 ± 0,214
Total	30	8,720 ± 1,773	8,980 ± 1,891	0,260 ± 0,190

Tabel 3.11 comparasi test showed that there was no difference COHb levels workerwith type blood (p>0,05)

III.12. Relationship between with Indeks MassBody (IMB) with COHb levels

Tabel 3.12. test result COHb levelsbefore and after working based on IMB categori

IMB Categori	total	COHb before Mean ± SD	COHb after Mean ± SD	COHb difference Mean ± SD
Thin	2	10,090 ± 1,032	10,465 ± 0,870	0,375 ± 0,163
Normal	19	8,384 ± 1,979	8,596 ± 2,106	0,212 ± 0,179
Fat	9	9,124 ± 1,237	9,460 ± 1,321	0,336 ± 0,201
Total	30	8,720 ± 1,773	8,980 ± 1,891	0,260 ± 0,190
Value (p) SignificantAnova: (p) : 0,321			**(p) : 0,282**	**(p) : 0,190**

Tabel 3.12 statistical test Anova showed that no difference COHb levels between IMB (p>0,05).

III.13. Result factors associated with COHb levels

Tabel 5.13. Summary of test COHB levels before, after and difference working

NO	Variable Independen	Statistical Test	COHb before working	COHbafter working	diffrenceCOHb
1	Co Levels	Spearman corelation	0,017*	0,017*	0,000*
2	Gender	T test 2 Indp sample	0,000*	0,000*	0,029*
3	Age	Pearson corelation	0,478	0,534	0,673
4	Work Period	Spearman corelation	0,781	0,829	0,227

5	Hb Levels	Pearson corelation	0,000*	0,000*	0,014*
6	Body Position at work	t test 2 indp sample	0,720	0,722	0,849
7	Smoking habits	t test 2 indp sample	0,002*	0,001*	0,035*
8	Type blood	Anova	0,533	0,510	0,273
9	IMB	Anova	0,321	0,282	0,190

Keterangan: * there is corelation

Independent samples of t2 test states that COHb levels were not significantly different between anemia and normal workers (p = 0.77 for COHb before working; p = 0.76 for COHb after working; p = 0.73 for difference COHb). In addition there is a difference between COHb levels before working groups of male who do not smoke (8.8 ± 1.0%) compared with famale who do not to smoke COHb levels (6.7 ± 1.6%).After working, COHb both groups continued to show the difference that COHb levels higher male than female.

IV. DISCUSSION

1. Relationship of Gender with COHb levels plaza x Surabaya parking officers.

The results showed levels of COHb before working, after working and COHb difference in men is higher than in women (2 independent samples t test; p <0.001; p <0.001; p = 0.029), made possible as a result of exposure to CO working environment plus history of Smoking thus affecting the ability of the lungs and vital oxygen needs someone that affect the levels of COHb, is directly proportional to the results. Rachmawati (2013) analyzed the effects of air emissions on a limestone processing centers for pulmonary function impairment and community workers in the karas Village, District of Sedan, Rembang regency, the results of research shows the influence of the working environment of air to pulmonary function impairment in the community center in the village of limestone processing parameters in Karas village for dust and gases of CO, NO2 and SO2 while it is not affected to the pulmonary function impairment.

2. Relationship of Age with COHb levels plaza x Surabaya parking officer.

There is no relationship between age and COHb levels (p> 0.05) 0.673. Age as one individual susceptibility factors, theoretically age is directly proportional to the levels of COHb in the blood, due to the elastic properties of the lung did not change at the age of 7-39 years, but the tendency to decrease after age 40 years. This needs to be taken into account researchers CO levels because the older, someone will be increasingly vulnerable to exposure to CO, so that his/her COHb levels will be higher (Siswanto, 2008).

3. relationship of employment period with COHb levels of plaza x Surabaya parking workers

There is no relationship between tenure with COHb levels before, after working and COHb difference (p> 0.05). Theoretically working life is directly proportional to the levels of COHb in the blood, (According to the ILO (1983), which repeated exposure to moderate levels may lead to adaptation. The mechanism of adaptation is similar to the mechanism of the high tolerance to hypoxia. So this tenure of workers still ranges from less than 3 years may have not undergone a process of adaptation. Theoretically working life is directly proportional to the levels of COHb in the blood, it is possible occurrence of physical readiness.

4. Relationship of Hb (hemoglobin) to COHb levels of plaza x Surabaya Parking workers

There is a relationship between Hb level of workers with COHb levels in the blood (p <0.001; p <0.001; p = 0.014). Hb In theoretically is directly proportional to the levels of COHb in the blood due to carbon monoxides (CO) can shift the oxygen bound to hemoglobin and hemoglobin binds into carboxyhemoglobin. This is due to the affinity of carbon monoxide to hemoglobin 240 times stronger than the affinity of oxygen to hemoglobin. CO tends to bind with hemoglobin in the long term (Slamet, 1996). Carboxyhemoglobin are not capable of carrying oxygen to tissue oxygen supply is interrupted (Moya et al., 1985). So if found much Hb in the blood then, CO binding ability is greater.

5. relationship of body position while working toward COHb levels of plaza x Surabaya Parking workers

There is no difference of COHb levels between workers who do the job standing with sitting (p> 0.05). This is because the density of CO is lighter than air vapor density = 0.97 (Siswanto, 1994). With a specific gravity lighter than air, the flue of CO gas out of the exhaust, then, exhaust gas as a source of CO, CO density is not too different from the density of air, the height of the sitting and standing workers get the same exposure to CO.

6. Relationship of Smoking Habit with COHb levels of plaza x Surabaya Parking workers

Since each puff of smoke of cigarette contains as many as 700-800 ppm CO (Siswanto, 1994). The results of two independent samples t-test showed that smokers with higher COHb levels of 0.3% was significantly better COHb, compared with non-smokers workers of 0.1%, so there is a relationship COHb levels to smoking. If in a room there are people who smoke, will cause the concentration of CO in the room rises. People who smoke will emit smoke containing CO gas with a high concentration. High concentration of CO gas in regards smoke causes blood COHb content of the smoke so increased. This situation is certainly very harmful to the health of

smoker. Smoker in a long time (heavy smokers) his COHb concentrations in the blood of about 6.9%. This causes a heavy smoker easily get heart problem. People who do not smoke but are in the same room with people who smoke have the same risk with people who smoke, because unwitting people who do not smoke are breathing air contaminated with smoke, thereby increasing levels of COHb in the blood anyway (Chaeruddin2006).

Smoke of cigarette contains about 4.000 chemicals were divided into two components, namely the gas phase (gas component) and particulate phase (solid components or particles) (Golding, 1995). The most important component is solid tar is carcinogenic materials and nicotine, the addictive substance dependence or addiction causes (Aditama, 2001), while the most dangerous carbon monoxide gas component among others because it is a cause of cardiovascular disease as a result of induced hypoxemia (Golding, 1995).

7. relationship of Blood type toward COHb levels of plaza x Surabaya Parking workers

There is No difference between COHb levels to workers with A blood group, B, AB, O ($p > 0.05$) either COHb levels before, after and difference COHb. According Rhesus Isoimmunization: Increased hemolysis during early 716-712 (1994) Blood type is the result of blood grouping based on the presence or absence of antigenic substances on the surface of red blood cells (erythrocytes). Erythrocytes is the main part of the blood cells. Each cubic mm of blood in an adult male containing approximately 5 million red blood cells and in an adult female is approximately 4 million red blood cells, there are different types of protein and carbohydrates on the surface of red blood cell membrane. Each red blood cell contains 200 million hemoglobin molecules. Hemoglobin (Hb) is a protein that contains iron compounds hemin. CO binds reversibly to hemoglobin in circulating erythrocytes to form COHb although other heme protein degradation also contributes to endogenous CO and bilirubin production, these sources accounted for less than 25%..

8. Relationship nutritional status (BMI) with COHb levels plaza parking officer x Surabaya

There is no difference between workers with COHb levels of body mass index (BMI) underweight, normal and overweight, both COHb before and after or COHb difference ($p > 0.05$). Keeping with complete nutrition needs of the body, which consumes four of five perfectly healthy, because of the levels of COHb influenced nutrient intake in the body such as iron, copper, pyridoxine and others. Nutrition is a factor that affects the CO absorption by the body. The state of malnutrition will increase the levels of COHb in the blood Supariasa, (2002).

V. CONCLUSION

Based on the resultsof the discussion canbe obtainedasfollows:

1. 73% of parking workers in plaza x Surabaya and the majority of male and aged less than 40 years. Workers at the site used to working in a standing position (60%). Most workers in the habit of smoking (60%) and the majority of workers are in the category of BMI normal (63.3%). Most respondents have blood type O and B, and most of them suffer anemia (20%).
2. The average CO levels in the environment around the plaza parking location x of 8.7 ± 6.4 ppm, with the highest levels of the motor section is 16.1 ppm, while in the LG, P1, P2 respectively by 4.8 , 4.6 the levels of CO in the parking motor has exceeded the threshold (9 ppm).
3. COHb levels were not significantly different between normal and anemic workers
4. There is a difference between COHb levels in male workers do not smoke ($8.8 \pm 1.0\%$) compared with women not to smoke COHb levels ($6.7 \pm 1.6\%$).
5. Gender, smoking, hemoglobin level, and levels of CO environmental factor associated with COHb levels in plaza x Surabaya Parking workers.

VI. SUGGESTION

There were suggestions that can recommend to the company, readers, and andrespondents on this study as follows:

1. To Management plaza x perform additional local exhaust particularly at the motor park for dilution CO from vehicle exhaust and smoke of cigarette.
2. The existence of an appeal to the parking workers from smoking.
3. Need for rolling plaza x parking attendant and administration of vitamin C and E as an antioxidant
4. It should be regular health checks at least once a year of plaza x workers
5. It Need for monitoring, supervising and periodic evaluation of the concentration of CO in park plaza x Surabaya air.

REFERENCES

[1]. Anies, (2006). Simpul-simpulBiomonitoring: Manajemenlingkungan, Jakarta EGC.
[2]. Arikunto, S.,(2006). ProsedurPenelitian. RinekaCipta.Jakarta, Hal. 130.
[3]. BadanStandarNasional.,(2005). SNI 19-0232-2005 :NilaiAmbang Batas (NAB) ZatBiologicals. Twelfth Edition. Merck & Co.,Inc. New Jersey. 1996. p. 296

[4]. Bokonjic, (1963). EkologidanKesehatan II, CerminDuniaKedokteran. Jakarta.
[5]. Budiyono,A.(2009). Waspadai CO DitempatParkirTertutup .http://newspaper pikiran Carbon Monoxide. (Sitasi 2 Juli 2010).
[6]. Depkes.RI.(2008).Parameter PencemaranUdaraTerhadapKesehatan http // www. depkes .go.id/download/udara. pdf. (sitasi 2 Februari 2013)
[7]. Ekasatya N, 1991 PencegahandanPenanggulanganPencemaranLingkungan. Jakarta.FKUI
[8]. Fardiaz, Srikandi., (1992). Polusi Air danudara. Yogyakarta: Kanisius, hal 94-102
[9]. FKM Unair., (2013). PanduanPenulisanUsulanPenelitiandanTesis. Program Magister FKM Unair Surabaya.
[10]. Ganong, W.F.,(1990). Fisiologiskedokteran, Edisi10th.ed.,AlihBahasa, Adjie Dharma Jakarta : EGC PenerbitBukuKedokteran.
[11]. Guyton, Arthur.C.1993. FisiologiManusiadanMekanismeTerhadapPenyakit EGC.
[12]. H.J. Mukono,(1992), PencemaranudaradanPengaruhnyaterhadapgangguansaluranpernafasan. Surabaya : Airlangga University Press, hal 18-19
[13]. H.J. Mukono,(2010), Prinsipdasarkesehatanlingkungan. Airlangga university Press : Surabaya.
[14]. Haanen. C. Kunst. Va. Jm. Wagener. DjThBurhouts J. PengantarIlmuPenyakit.
[15]. Handayani, M..(2004). Keracunan yang disebabkan Gas KarbonMonoksida. Info POM
[16]. HarianKompas. MadudanRacunBensinBertimbal. 7 November 1996.
[17]. Jamal, Sarjaini.(1992). PengaruhRokokTerhadapKesehatan. MajalahCerminDuniaFarmasi, No.11.
[18]. Joseph M, Patula (1989). The Object of Environmental Ethics, dalam EnvironmentalkesehatanPekerja. PPS HiperkesMedis. FakultasKedokteranAirlanggaUniversity Press : Surabaya.
[19]. Kimia di udaraTempatKerja.Jakarta: BadanStandardisasiNasional, hal.1lingkunganHidup, Seminar NasionalMetodeAnalisa Kimia, Bandung.
[20]. Marji. 1999. Penggunaansaluran Gas BuanguntukmereduksiKarbonMonoksida. Edisi 12. Jakarta EGC.
[21]. Nita..(2007). MerokokPasifBisaLebihBebahaya Dari PadaMerokokAktif. http://www.majalah-farmacia.com.(sitasi 09 maret 2010)
[22]. Nomi, Toshitaka. 2009. MembacaKaraktekMelaluiGolonganDarah. Gramedia: Jakarta
[23]. Occupational Safety and Heatlh Organization, (2002) Carbon Monoxyde Poisoning, U.S. Departement of Labor, available from : http://www.osha.gov
[24]. Oke zone,(2007). KeracunanKarbonmonoksida. http://www.google.co.id. (Sitasi15 Juni 2013)
[25]. Pearce, Evelyn. (2000). AnatomidanFisiologiuntukParamedis. PT GramediaPustakaUtama. Jakarta
[26]. Prabu.,(2008). KarbonMonoksida (CO). http :/www.Putraprabu.wordpress. com .(sitasi 14 Februari 2010)
[27]. Pudjiastuti, L.,Rendra,S.,Santoso,H.,(1998). KualitasUdaraRuang.Jakarta: DirektoratJenderalpendidikanTinggidepartemenPendidikan Dan Kebudayaan, hal 19.
[28]. Sadikin, M. 2002. BiokimiaDarah. WidyaMedika. Jakarta. p. 12-24
[29]. Saeni (1989), Kimia Lingkungan, PAU-IPB Bogor.
[30]. Saputra, YokyEdi., (2009). KarbonmonoksidadanDampaknyaTerhadapKesehatan. http://www.chem-is-try.org. (sitasi 05 maret 2010).
[31]. Siswanto, A, (1990), KarbonMonoksida. HiperkesdanKeselamatanKerjaJawaTimur, hal 383-441
[32]. Siswanto, A, (1991), ToksikologiIndustri, BalaiHiperkesdanKeselamatanKerjaJawaTimurDepartemenTenagaKerja, hal 12-14
[33]. Suardi, Rudi.,(2007). SistemManajemenKesehatandanKeselamatanKerja. Jakarta : PPM, hal 79 – 80
[34]. Suharjo, Saputro, (2003). RokokvsKesehatanPublikRefleksiHariKesehatanSedunia 7 April. Republika Online. http://www.Yahoo.com
[35]. Suma'mur P.K, (1984), Hygiene Perusahaan danKesehatanKerja ,GunungAgung, Jakarta.
[36]. Suma'mur, PK (2009). Higiene Perusahaan danKesehatanKerja (Hiperkes). Jakarta :SagungSeto,hal 192, 198.
[37]. SuratEdaranMenteriTenagaKerjadanTransmigrasi No. 01 Tahun 1997. NilaiAmbang Batas KarbonMonoksida, Jakarta
[38]. Susanto, (2008). Artikel Risk Assessment danUpayaPengembanganJasaKonsultasi di BidangManajemenRisiko. Fraud Audit Task Force (FTAF). BPKB Capacity Building Project.
[39]. SuyonoJokodan Caroline Wijaya (1986). Early Detection Of Occupational Disease. WHO : Geneva).
[40]. Triana, Eka, (2008).StudiKomparasi Kadar KarbonMonoksida (CO) di Udarapadatempatkedatangandanpemberangkatan Bus di terminal bus Giwangan Yogyakarta. KaryaTulisIlmiah. Program Studi Diploma III KesehatanLingkungan. Purwokerto.
[41]. Tugaswati, Tri, A (2009).Emisi Gas BuangKendaraanBermotordanDampaknyaTerhadapKesehatan, http://www.kpbb.org/download (situasi 17 Februari2010).

[42]. Wicaksana, A, dkk (2002). DampakKeracunan Gas KarbonMonoksidaBagiKesehatanpekerja. PPS HiperkesMedis. FakultasKedokteranUniversitas Indonesia. Jakarta. CerminDuniaKedokteran No. 136
[43]. Wijetillekedankarunaratne, (1995). PrediksiKonsentrasiCOHb yang terikatdalamdarahdilihatdarijenispekerjaannya. Jakarta. EGC.
[44]. Wisaksono, W dkk (1981), PerananAnalisa Kimia DalamMenunjangMasalahKesehatan.Jakarta : ITB, hal 148.
[45]. World Health Organization, (1979). Enviromental Health Criteria13, Carbon Monoxide, Genewa : 35 – 43.
[46]. World Health Organization, (1999). Enviromental Health Criteria 213, Carbon Monoxide (Second Edition), Genewa : 30 – 43
[47]. Yasin, U, 2006). UdaraBersihSemakinMahal, http://www.yayasan-lembak .blogspot.com. (situasi 16 April 2010)