Indonesian Journal of Global Health Research
Volume 4 Number 2, May 2022
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

DESCRIPTION OF CARBOXYHEMOGLOBIN (COHB) LEVELS IN PARKIR ATTENDANTS BASED ON WORKING PERIOD AROUND BEJEN MARKET

Tri Harningsih[1]*, Indah Tri Susilowati[1], Purwati[1], Definingsih Yuliastuti[2]
[1]Sekolah Tinggi Ilmu Kesehatan Nasional, Jl. Raya Solo - Baki, Bangorwo, Kwarasan, Kec. Grogol, Kabupaten Sukoharjo, Central Java 57552, Indonesia
[2]Sekolah Tinggi Ilmu Kesehatan Serulingmas Cilacap, Jl. Raya Maos No. 505, Maos, Kampungbaru, Karangreja, Cilacap, Kabupaten Cilacap, Central Java 53272, Indonesia
*tri.harningsih@stikesnas.ac.id

ABSTRACT
Carbon monoxide is the largest contributor to air pollution. The source of carbon monoxide contamination comes from the smoke exhaust of motor vehicles. This research was to find out the description of carboxyhemoglobin levels in parking attendants based on working period around Bejen Market. This research method uses descriptive research. The sampling technique used is *quota sampling*. The research subjects were 8 parking attendants around Bejen market. Examination of carboxyhemoglobin levels using UV-Vis spectrophotometer. The results showed that in the blood of all respondents there was an increase in carboxyhemoglobin levels. The sample with code A1 has a level of 5,56%; sample A2 = 5,20%; sample A3 = 5,40%; sample A4 = 5,56%; sample A5 = 6,30%; sample A6 = 5,66%; sample A7 = 5,80%; and sample A8 = 6,36%. The level of carboxyhemoglobin in parking attendants around Bejen market exceeded the normal limit of >3,5% by the Regulation of the Minister Health Republic Indonesia Number 70 of 2016.

Keywords: carbon monoxide; carboxyhemoglobin; parking attendants; quota sampling; working period

First Received	Revised	Accepted
10 Maret 2022	19 April 2022	18 May 2022
Final Proof Received		**Published**
13 May 2022		30 May 2022

How to cite (in APA style)
Harningsih, T., Susilowati, I., Purwati, P., & Yuliastuti, D. (2022). Description of Carboxyhemoglobin (COHb) Levels in Parkir Attendants Based on Working Period Around Bejen Market. *Indonesian Journal of Global Health Research*, *4*(2), 231-234. https://doi.org/10.37287/ijghr.v4i2.708

INTRODUCTION

Motorized vehicles such as cars, trucks, motorbikes, and buses are the types of land transportation that are widely used in Indonesia. These motorized vehicles produce exhaust gases which are hazardous components, such as carbon monoxide (CO), nitrogen oxides (NOx), carbon dioxide gas (CO2), and carbon fog (Syahbatini, 2011). Carbon monoxide (CO) is the result of incomplete combustion of fuels that contain carbon atoms and are colorless and odorless. CO gas is very toxic with acute complaints of headaches to cause death. CO gas enters the human body through the inhalation process. Furthermore, CO will enter the alveoli and spread into the blood circulation (Mukono, 2011).

Hemoglobin in blood binds more easily to CO than O2, this causes inhibition of binding of hemoglobin to oxygen. CO which has bound hemoglobin will form carboxyhemoglobin (COHb) (Khairina, 2019). The concentration of CO in the air is influenced by the activity of motorized vehicles so that the more crowded the existing motorized vehicles, the higher the level of CO pollution in the air. Based on research conducted by Rahmah's research (2019), it states that respondents with a working period of less than 1 year have COHb levels with an average of 4.39% and respondents with a working period of more than 3 years have COHb

levels with an average 8.50%. According to Khairina (2019), 92.3% of respondents with a working period of more than 6 years have higher COHb levels than respondents with a tenure of 1-3 years. Based on the above background, researchers are interested in conducting research on the description of carboxyhemoglobin (COHb) levels in parking attendants based on years of service around Bejen Market, Karanganyar.

METHOD

This research method uses a descriptive type of research, namely to describe the levels of carboxyhemoglobin (COHb) in parking attendants based on years of service around Bejen Market, Karanganyar. The population of this research is parking attendants around Pasar Bejen Karanganyar. The research sample is the blood of 8 parking attendants. The sampling technique used is quota sampling, where the researcher takes a predetermined number of samples from the subject group with the appropriate criteria including: male sex, productive age 20-55 years, has a minimum duration of 6 hours of exposure a day, has a less than 2 years, 2-3 years, and more than 3 years. The independent variable in this study is the period of service. The dependent variable in this study was the level of carboxyhemoglobin in the blood of parking attendants at Pasar Bejen Karanganyar. The source of data in this study is primary data obtained from parking attendants around Bejen Market Karanganyar through filling out questionnaires and obtained from the results of examination of carboxyhemoglobin levels using a UV-Vis spectrophotometer.

Determination of Maximum Wavelength

1) Put 20 mL of 0.1% NH4OH reagent into the Erlenmeyer.
2) Added 10 l of whole blood, homogenized.
3) Pipette 4 mL of the mixture and then put it into a 5 mL test tube.
4) Added 20 mg Na2S2O4, homogenize.
5) Then read the absorbance at a wavelength (λ) 400-700 nm using a UV-Vis spectrophotometer. The maximum wavelength is obtained from the highest absorbance peak on the curve shown.

Determination of Operating Time

1) Pipette 20 mL of 0.1% NH4OH reagent into the Erlenmeyer.
2) Add 10 l whole blood, homogenize
3) Pipette 4 mL of the mixture and then put it into a 5 mL test tube.
4) Add 20 mg Na2S2O4, homogenize.
5) Then the test solution was measured at 1, 2, 3, 4, 5, 6, 7, 8,….. 3600 seconds (until a stable/constant curve was obtained) using a UV-Vis spectrophotometer.

COHb Working Procedure

1) Prepared 2 test tubes with a size of 5 mL, each labeled R1 (Reagent) and SPL (Reagent sample).
2) Prepare 20 mL of 0.1% NH4OH solution and put it in an Erlenmeyer.
3) Add 10 l whole blood, homogenize
4) Put the mixture into each test tube labeled R1 and SPL, each as much as 4 mL.
5) Add 20 mg of sodium dithionite (Na2S2O4) to the tube labeled SPL, mix until homogeneous. Then incubate for 8 minutes.
6) Read absorbance R1 and SPL with UV-Vis spectrophotometer at a maximum wavelength of 414.2 nm.
7) Read absorbance R1 as (ΔA) and absorbance standard SPL as (ΔarHb

8) The results are calculated using the calculation formula as below:

$$COHb = \frac{\Delta A}{\Delta arHb} \times 6{,}08\%$$

Information :
COHb: Carboxyhemoglobin levels
A : Absorbance of reagent
arHb : Absorbance standard of sample
6.08% : Conversion factor of percent CO saturation in Hb

RESULTS

This research began with socialization, giving questionnaires, giving questionnaires to prevent transmission of Covid-19, and informed consent to 8 respondents. Respondents who had agreed to the informed consent were then taken venous blood using a 3 mL K3EDTA vacuum tube. The blood sample that was already in the vacuum tube was put into an ice box containing dry ice to make the temperature inside the ice box cold at 4°C. Carboxyhemoglobin levels were checked using a Shimadzu–1240 Mini UV Spectrophotometer. Examination of the sample is carried out by determining the maximum wavelength and operating time as a condition for reading the sample using a UV-Vis spectrophotometer. The results of the examination showed that the absorbance was stable at a maximum wavelength of 416.2 nm.

Tabel 1.
Hasil Pemeriksaan COHb

Sample Code	COHb Level (%)	Years of Service		
		<2 years	2-3 years	>3 years
A1	5,56	-	-	7 years
A2	5,20	22 months	-	-
A3	5,40	-	3 years	-
A4	5,56	-	-	10 years
A5	6,30	-	-	9 years
A6	5,66	-	-	8 years
A7	5,80	-	-	10 years
A8	6,36	-	-	12 years

DISCUSSION

The duration of the work period and the length of exposure received by each respondent every day is in the range of 8 hours. Sample code (A4,A5,A7,A8) duration of exposure every day for 8 hours and rarely use a mask when working so that COHb levels are relatively higher. Meanwhile, respondents (A1,A2,A3,A6) had a daily exposure of about 8 hours and routinely used masks from the beginning of the covid pandemic period starting in 2019. The results of this study are in line with the research of Budgeti, et al (2016), stating that respondents who having a working period of more than 3 years had lower COHb levels than respondents with a tenure of less than 3 years.

High levels of carboxyhemoglobin in respondents can be caused by several factors such as years of work, smoking habits, length of exposure, and the use of PPE for respondents as parking attendants around Bejen Market. The working period of 6 respondents (sample code A1, A4, A5, A6, A7, A8) has a duration of more than 3 years working as a parking attendant. The remaining 2 respondents (sample code A2 and A3) with a working period of 1-3 years. The overall results of the carboxyhemoglobin levels of 8 respondents exceeded the normal

limit, which is > 3.5% of what has been stipulated by the Regulation of the Minister of Health of the Republic of Indonesia Number 70 of 2016.

In addition to the use of PPE, the length of exposure also affects COHb levels. This is also supported by research by Muttia, et al (2018), which states that there is a relationship between length of exposure and COHb concentration, where there are 20 respondents with an exposure length of 8 hours per day or for 80 days per year whose COHb levels do not meet the requirements. This is because the longer a person is exposed to carbon monoxide gas, the greater the concentration of COHb will be, because the respondent inhales exhaust fumes from vehicles that produce incomplete combustion so that it will produce carbon monoxide gas. The increase in COHb levels is not only caused by years of work but can also be caused by other factors such as length of exposure and habits of using PPE during work. This is supported by research by Budgeti, et al (2016), which states that most of the respondents who do not use masks are 28 people and those who use masks are 1 person. The highest average COHb concentration was in respondents who did not use masks. Although there was no significant difference, based on descriptive data, it can be seen that the highest average COHb levels were in respondents who did not use masks.

CONCLUSION

COHb levels in parking attendants around Bejen Market with sample code A1 have levels of 5.56%; sample A2 = 5.20%; sample A3 = 5.40%; sample A4 = 5.56%; sample A5 = 6.30%; sample A6 = 5.66%; sample A7 = 5.80%; sample A8 = 6.36%. COHb levels in 8 blood samples of parking attendants around Bejen Market exceeded the normal limit, which was > 3.5% of what was stipulated in the Regulation of the Minister of Health of the Republic of Indonesia Number 70 of 2016.

REFERENCES

Anggarani D.N, Mursid R, Nurjazuli. (2016). Hubungan Kepadatan Lalu Lintas Dengan Konsentrasi COHb Pada Masyarakat Beresiko Tinggi Di Sepanjang Jalan Nasional Kota Semarang. *Jurnal Kesehatan Lingkungan.* Vol 4: (2). ISSN: 2356-3346).

Khairina, M. (2019). Gambaran Kadar CO Udara, COHb Dan Tekanan Darah Pekerja Basement Pusat Perbelanjaan X Kota Malang. *Jurnal Kesehatan Lingkungan*. Vol 11 (2). ISSN: 1829-7285.

MENKES. (2016). *PERMENKES Nomor 70 Tahun 2016 tentang Standar Dan Persyaratan Kesehatan Lingkungan Kerja Industri*. Jakarta: Mentri Kesehatan.

Mukono, J. (2011). Aspek Kesehatan Pencemaran Udara. *Skripsi*. Surabaya: Airlangga University Press.

Muttia Hazsya, Nurjazuli, hanan Lanang. (2018). Hubungan Konsentrasi Karbon Monoksida (CO) Dan Faktor-Faktor Resiko Dengan Konsentrasi COHb Dalam Darah Pada Masyarakat Beresiko Di Sepanjang Jalan Setiabudi Semarang. *Jurnal Kesehatan Masyarakat*. Vol 6 (6). ISSN: 2356-3346.

Rahmah Nur Safiatur. (2019). Hubungan Paparan Gas CO Karbon monoksida) Di Udara Dengan Kadar COHb Darah Petugas Parkir *Basement* Di *Mall* Surabaya. *Jurnal Kesehatan Lingkungan*. Vol. 11. No. 3. ISSN: 1829-7285. Hal 226-232.

Syahbatini, A. (2011). *Emisi Gas Buang Kendaraan Bermotor Dan Material Pereduksi*. Kompasiana.

Wimpy dan Harningsih T. (2019). Korelasi Kadar Karboksihemoglobin Terhadap Tekanan Darah Penduduk Di Sekitar Terminal Bus Tirtonadi Surakarta. *Jurnal Of Chemistry*. 7. 52-57.