DESCRIPTION OF HEMOGLOBIN LEVELS IN TINALOGA PUBLIC FUEL FILLING STATION (SPBU) GUYS, GORONTALO CITY

Regina Pondaag[1)], Rachma[2)], Diah Astuti Paramita[3)]
[1)]Bina Mandiri University Gorontalo, [2)]Rs. Wisdom of Makassar, [3)]Bunda General Hospital
E-mail: regina98655@gmail.com, rahmaanalis.re@gmail.com, diahparamita@gmail.com.

ABSTRACT

One of the jobs that is very risky is working as a gas station attendant, exposure to air pollutants released by motor vehicle and car emissions which, if they enter the officer's body, will bind to erythrocytes so that they can inhibit the heme system and result in reduced Hb production in erythrocytes. This research aims to determine Hemoglobin (Hb) levels in Tinaloga gas station officers, Gorontalo City. The research method was carried out descriptively with a quantitative approach. The population in the study were all officers at the Tinaloga gas station, Gorontalo City, with a sampling technique using purposive sampling technique to obtain a total sample of 14 people. The research results showed that the lowest Hb level was 11.1 gr/dl, and the highest Hb was 14.8 gr/dl. The average value of Hb levels is 13.5-16.5 gr/dl.Conclusion namely abnormal Hemoglobin (Hb) levels in 13 samples (92.9%), and normal Hb levels in only 1 sample (7.1%), Suggestions for gas station officers to wear personal protective equipment (PPE) when working for example masks, gloves, thereby reducing exposure to lead (Pb) levels or gasoline vapors.

Keywords: Hemoglobin, gas station attendant.

INTRODUCTION

Public fuel filling stations (SPBU) are public infrastructure provided by the Government through PT. Pertamina for the wider community to meet their fuel oil (BBM) needs. The types of fuel available at gas stations are:premium, diesel, Pertamax and Pertamax Plus (Chantika et al, 2018). Currently, fuel oil (BBM) is still the largest source of energy for motorized vehicles, the availability of fuel is very much needed so that people can carry out their activities smoothly (Directorate General of Oil and Gas, 2018).

In Indonesia, until April 2022, based on data from the Ministry of Energy and Mineral Resources (ESDM), the number of gas stations has reached 6,729 units, where West Java Province is the province with the most gas stations, namely 1,017 units. Meanwhile, the province with the fewest number of gas stations is West Sulawesi Province with 26 gas stations. Meanwhile, Gorontalo Province ranks 30th, above West Sulawesi Province with the same number as North Kalimantan Province which also has 31 units (Putri, 2022).

Even though its existence is very important, its use can have an impact on reducing air quality and can have an effect on health problems, this occurs because of the content of the fuel itself. This fuel is used to carry out the combustion process in the engine combustion chamber, the

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remaining or waste from the materials themselves will form a compound in the form of: sulfur dioxide (SO2), lead (Pb), and carbon monoxide (CO). These three chemical compounds are very dangerous for human health, especially for people who are exposed every day to fuel or waste from these fuels (Directorate General of Oil and Gas, 2018).

One of the jobs that is at risk of exposure to chemical compounds from fuel is gas station attendants. This is because these officers continue to come into contact and exposure every day for several hours to air pollutants emitted by motor vehicle and car emissions. The abundance of air pollutants at gas stations and roads will disrupt health, especially if the pollutants enter the blood and bind to erythrocytes, they will inhibit the heme system, resulting in reduced Hb production in erythrocytes. In addition, when carbon monoxide gas enters the body, it will bind to hemoglobin (Hb) to form COHb which causes this hemoglobin to be unable to bind oxygen, resulting in tissue hypoxia (Klopfleisch et al., 2017).

Erythrocytes are able to concentrate hemoglobin in cell fluid to around 34 g/dL cells. These erythrocytes are the part of the blood that contains hemoglobin (Hb). Hemoglobin is an oxygen-binding biomolecule, while blood's red color is influenced by oxygen absorbed from the lungs. In normal people, the hemoglobin percentage is almost always close to the maximum in each cell. So hemoglobin has a large and important role in every human's body (Setiarto and Karo, 2020).

Many things affect a person's hemoglobin levels, one of which is air pollution. Air pollution is a decrease in air quality due toair pollution with other chemical compounds. One source of air pollution comes from motor vehicle or car exhaust fumes. The gas station area which is also crowded with motorized vehicles and cars can have a negative impact on gas station officers. The increasing number of motorized vehicles and cars will also increase, giving rise to health problems (Linda, 2017).

Gas station attendants are a group of workers who are at risk exposure to dangerous chemicals, especially lead from gasoline andgas emissions from motorized vehicles waiting in line to refuel or vehicles leaving after they have finished filling up with petrol. The position of gas stations located near the highway makes it easier for officers to be exposed to lead pollutants from the fumes of vehicles traveling on the highway (Almunjiat et al., 2016).

Exposure to pollution in the body will result in chronic effects because dangerous chemical compounds will enter through the respiratory tract and digestive tract. Then it can enter the blood and bind to erythrocytes which contain hemoglobin and is metabolized by the body into the proximal tubules in the kidneys. So this will disrupt the physiological function of the kidney itself. The relationship between exposure to lead (Pb) and a decrease in hemoglobin levels in the blood occurs due to disruption of the formation of red blood cells (erythropoiesis) by inhibiting the synthesis of protoporphyrin and disrupting the absorption of iron, poisoning due to contamination by dangerous chemicals. entering the body can also cause a decrease in the number of red blood cells and shorten the lifespan of red blood cells, as well as low hemoglobin levels, which can cause health impacts such as anemia (Muliyadi et al., 2015).

Normal hemoglobin levels are: in women around 12-14 g/dl and men around

13-16 g/dl. A situation where the hemoglobin level is less than the normal limit will cause anemia (Firani, 2018). The way to measure Hb levels can be done using manual methods, semi-automatic methods and automatic methods. The manual method can be done using the Sahli method which uses colorimetric principles with visual observation. In the semi-automatic method, the cyanmethemoglobin (HiCN) method can be used which also uses colorimetric principles but reading Hb levels using a spectrophotometer.(Ubaidillah, 2020). Meanwhile, automatic methods can use an Hb meter and a hematology analyzer. The Hb Meter is a meter using the Point of Care Testing (POCT) method which is specifically designed for checking hemoglobin levels with whole blood samples. Meanwhile, a hematology analyzer is a tool used to measure all hematology parameters, including Hb (Magfiroh and Oktavianti, 2016).

Examination of hemoglobin in the blood has a very important role in diagnosing a disease, because hemoglobin isone of the special proteins present in red blood cells with a function special. In the body, Hb functions to transport oxygen to all body tissues for useas a transportation medium (Setiarto and Karo, 2020). Hb production in erythrocytes can occur normally if there is no obstacle to heme synthesis. However, if there is exposure to compounds contained in fuel such as lead (Pb), then Hb production in erythrocytes will also be disrupted, which can cause anemia (Rosita and Widiarti, 2018).

The results of previous research conducted byEltin (2016), showed that of the 31 respondents, gas station operator officers, the highest hemoglobin level was 18.2 g/dL and the lowest hemoglobin level was 10.4 g/dL. The results of the study showed that from the results of the examination the highest normal hemoglobin levels were found in 21 people (67.74%), however abnormal hemoglobin levels were still found in 10 people (32.25%). Meanwhile Manullang, et al. (2022), who examined hemoglobin levels in gas station attendants, obtained normal (50%) and abnormal (29.3%) men's Hb levels, normal (8.2%) and abnormal (12.5%) women's Hb levels.). Meanwhile, similar research for the Gorontalo Province region, as far as researchers have investigated, has never been carried out. Currently, as a city currently in the development stage, Gorontalo Province is an area that is experiencing a lot of development in the fields of industry, tourism and agriculture. Activities in the fields of industry, agriculture and tourism give rise to increased mobility. Increased mobility in various fields has an impact on increasing demand for fuel. The flow of vehicles going back and forth both within Gorontalo City and on the Trans Sulawesi road is often passed by vehicles with outside area codes.Gorontalo Province, of course these vehicles require fuel consumption while traveling (Yusuf and Koto, 2020).

Based on surveys and initial observations conducted by researchers atTinaloga gas station with gas station number 74.961.05 Tinaloga Gorontalo City,information was obtained that the average working period of gas station officers is 3-5 years and every day works for 7-8 hours. This most likely indicates that the officers at the gas station have been exposed to air pollutants, both monoxide and lead (Pb), which, if absorbed into the blood, will bind to red blood cells (erythrocytes) and will inhibit the process of forming hemoglobin (Hb), thereby causing impaired

erythrocyte formation (erthropoiesis) and abnormalities in Hb levels.

From the problems above, the author raised in a scientific research paper the importance of describing hemoglobin levels in gas station officers, for this reason the researcher took the research title: "Description of hemoglobin levels in Tinaloga gas station officers, Gorontalo City.

RESEARCH METHODS

The method in this research The research method was carried out descriptively with a quantitative approach. The population in the study were all officers at the Tinaloga gas station, Gorontalo City, with a sampling technique using purposive sampling technique to obtain a total sample of 14 people.

1. Pre Analytics
   The pre-analytics in this study include patient preparation, tools and materials used (Hb Meter (brandNesco Multi Check), lancet/auto click,70% alcohol cotton, dry cotton, brand glucometer stripsNesco Multi Check and capillary blood)
2. Analytic
   a. The tools and materials that will be used are prepared first.
   b. The HB strip is inserted into the Hb meter, the screen will automatically show a code and a blood drop sign indicating that the measurement is ready to be taken
   c. Capillary blood is taken and then dripped into the sample zone.
   d. The tool will count down and a "beep" sound will be heard, after which the results will appear on the tool monitor.
   e. The results that appear are then recorded and the strip is removed from the tool.
3. Post Analytics
   Based on the reference values for hemoglobin examination using the POCT tool, they are as follows:
   Woman : 12.1 – 15.1 gr/dL
   Man : 13.5 – 16.5gr/dL

RESEARCH RESULT

As explained previously, sample collection and examination was carried out at the Tinaloga gas station under the supervision or guidance of the Gorontalo North City Public Health Center laboratory staff with the aim of getting a picture of the Hemoglobin (Hb) levels in the gas station staff.Tinaloga uses a Nesco Multi Check brand Hb meter. The researcher used purposive sampling to determine the sample size by obtaining a sample of 13 people. The research results and data analysis in this study are as follows.

1. Description of Respondent Characteristics

a. Respondent's Length of Work

Table 4.1. Respondent CharacteristicsBased onLength of work.

Length of work	Frequency	Percentage (%)
1-5 years	3	21.4
6-10 years	6	42.9
> 10 years	5	35.7
Amount	**14**	**100.0**
Hb level		
Normal	1	7.1
Abnormal	13	92.9
Amount	**14**	**100.0**

(Source: Processed Primary Research Data, 2023).

Table 4.3 above shows that of the 14 respondents whose Hb levels were checked,

the majority of Hb levels showed abnormal results, namely 13 samples (92.9%), and only 1 sample (7.1%) had normal Hb levels.

The description of the Hb levels obtained in this study is as follows.

Table 4.3. Distribution of RespondentsDescription of Hb levels.

Sample Code	b level (g/dl)	Information
A	11.1	Abnormal
B	12.7	Abnormal
C	13.0	Abnormal
D	14.8	Normal
E	12.5	Abnormal
F	13.1	Abnormal
G	12.8	Abnormal
H	12.0	Abnormal
I	11.2	Abnormal
J	12.3	Abnormal
K	13.4	Abnormal
L	12.7	Abnormal
m	13.4	Abnormal
N	11.9	Abnormal
Amount	**176.9**	
verage Hb levels	**12.6**	

(Source: Processed Primary Research Data, 2023).

Table 4.4 above shows that after checking the Hb levels in 14 samples in this study, the lowest Hb levels were shown in sample code A, namely 11.1 g/dl, while the highest Hb levels were shown in sample code D, namely 14.8 g. /dl. The average Hb level is 12.6 g/dl.

The average value or mean Hb level was obtained by adding up all the Hb levels obtained in this study and then dividing it by the total number of samples studied. This is in accordance with Ghozali's (2018) statement, that the mean value is an average value obtained from the total number of scale values divided by the total sample size. The mean value can be interpreted as one number that represents the entire dataset. The average value is obtained from the sum of all the existing values from each data, then divided by the number of existing data.

DISCUSSION

This research was conducted involving 14 gas station officers as respondents, the research location was at the Tinaloga gas station, Gorontalo City. Taking capillary blood samples from respondents aims to measure the hemoglobin (Hb) levels of gas station officers using the Nesco Multi Check brand Hb Meter, Point of Care Testing (POCT) method.

This research lasted for 9 (nine) days starting from 16 to 24 September 2023. The research process began by distributing questionnaires and informed consent to gas station officers who carried out duties in the fuel filling section. After the questionnaire and informed consent were signed by the officer, the researcher took capillary blood to check the Hb levels of the respondents.

Based on the research that has been carried out and in accordance with the research results shown in tables 4.1 and 4.5 above, the results obtained were that of the 14 samples whose Hb levels were checked, the results showed that there were 13 samples (92.9%) that were abnormal, and only 1 sample (7.1%) had normal Hb levels. With the high percentage of abnormal Hb levels (less than normal/low values) in this study, it can be concluded that the majority of Tinaloga gas station officers have anemia.

What the researchers took is supported by the theory stated by Firani (2018), that anemia is a condition where the hemoglobin (Hb) level is less than the normal limit, while the normal Hb level is: in women it ranges from 12-14 g/dl and in men around 13-16 g/dl. This theory is also strengthened byKosasih and Setiawan (2016), who stated that a decrease in hemoglobin levels in the

blood can be influenced by several conditions, including: anemia, bleeding, chronic kidney disease, leukemia, low nutrition and high levels of iron, float acid, vitamin B12, or vitamin B6. low.

Based on Kawatu (2019),The influencing factors so that the majority of Hb levels obtained in this study were in the low limit were caused by exposure to premium and diesel fuel which contained lead and were inhaled by the gas station officers. That fuels such as premium and diesel release 95% of lead emissions which can pollute the air and can then be inhaled and absorbed by the officers' bodies so that it can cause health problems such as nausea, dizziness, digestive and respiratory problems, and a decrease in the level of physical and mental reaction power. The cases of anemia which occur more frequently in men are caused by 2 (two) things, firstly because in this study there were more men on duty at Tinaloga gas stations, and secondly because men worked more in refueling. to consumer vehicles, where the shift system at the Tinaloga gas station is mostly filled by male gas station officers. This causes male officers to be more likely to be exposed to dangerous chemicals contained in premium and diesel.

There was a decrease in Hb levels in gas station officers, both male and female, which was caused by exposure to dangerous chemicals, namely lead (Pb) contained in premium and diesel fuel, causing disruption in the formation of erythrocyte (red blood cell) production, resulting in anemia.This is confirmed by Muliyadi et al. (2015), which explains that exposure to premium and diesel fuel on the body will result in chronic effects because the dangerous chemical compounds will enter through the respiratory tract and digestive tract. Then it can enter the blood and bind to erythrocytes which contain hemoglobin and is metabolized by the body into the proximal tubules in the kidneys. So this will disrupt the physiological function of the kidney itself.

The relationship between exposure to lead (Pb) and a decrease in hemoglobin levels in the blood occurs due to disruption of the formation of red blood cells (erythropoiesis) by inhibiting the synthesis of protoporphyrin and interfering with the absorption of iron. Poisoning due to contamination by dangerous chemicals entering the body can also cause a decrease in the number of blood cells. red and shorten the life of red blood cells, as well as low hemoglobin levels, can have health impacts such as anemia Muliyadi et al. (2015).

Rosita and Widiarti (2018), added that Hb production in erythrocytes can occur normally if there are no obstacles to heme synthesis. However, if there is exposure to compounds contained in fuel such as lead (Pb), the production of Hb in erythrocytes will also be disrupted, which can cause anemia.

Apart from the explanation above, another thing that also contributes to the occurrence of anemia in the majority of Tinaloga gas station officers is that the officers work at the gas station. It can be seen in table 4.2 which explainsregarding the length or period of work of Tinaloga gas station officers, that the majority of gas station officers or as many as 6 people (42.9%) have worked for 6-10 years, then those who have worked for more than 10 years are 5 people (35.7%), and those who worked for 1-5 years were 3 people (21.4%). This clearly illustrates that as time increases at work and frequent contact with pollutants for a long time, the inhaled pollutants can affect the human blood formation system, namely causing anemia. This is as stated by

Kawatu (2019), thatIf pollutants enter the blood for a long period of time and continuously, then they bind to erythrocytes and can inhibit the heme system which results in reduced Hb production in erythrocytes.

Lead (Pb) that enters from vehicles fueled with leaded gasoline can accumulate in the body,Directorate General of Oil and Gas (2018) in the book Safety of Public Fuel Filling Stations (SPBU),states that the maximum limit for the amount of exposure to gasoline vapor in the air within a period of exposure is a maximum of 0.5 ppm. This means that with a concentration of 0.5 ppm, officers are still relatively safe working for 8 hours per day. Thus, it can also be concluded that the length of time officers work at gas stations allows the accumulation of lead in the body, causing erythropoiesis to be disturbed and ending in anemia.

These results are in line with the results of research conducted by Linda (2017) and Sari et al (2021), which in the results of research by Linda (2017) obtained normal hemoglobin levels of 43.50% and abnormal 56.50%, while the research results of Sari et al. (2021) obtained normal Hb levels of 41.70% and abnormal levels of 58.30%.

The occurrence of anemia in the majority of Tinaloga gas station officers is certainly quite serious, this is because anemia can have very serious impacts on the sufferer. Anemia has the risk of causing short-term and long-term impacts. The Indonesian Ministry of Health (2018), states that the short-term impacts of anemia can include easily experiencing fatigue (even after resting), pale skin, lack of energy, poor concentration, irritability, feeling sad easily, headaches and dizziness and frequent infections, occurring impaired concentration, decreased learning achievement (in children and adolescents), disrupts fitness and productivity. Meanwhile, in the long term, anemia can cause a decrease in the body's immunity, making it easier to get sick and a high risk of developing non-communicable diseases such as diabetes, obesity, heart and blood vessels, cancer, stroke and disability in old age (Sutriawan et al., 2020).

After drawing conclusions from this research that the majority of gas station officers suffer from anemia, what needs to be done is to treat this anemia. There are several ways that can be taken to treat anemia according to the Indonesian Ministry of Health. (2018), are: food. The doctor will recommend getting vitamin B12 injections or supplements.

Anemia caused by certain diseases can be treated using medication. Usually, the use of drugs will be given to those who suffer from autoimmune diseases. Drugs given to autoimmune sufferers are useful for preventing the body's immune system from destroying its own red blood cells. Medicines may also be given to those who suffer from anemia, but cannot undergo a bone marrow transplant. Apart from that, some of the drugs given also have the function of helping stimulate the spinal cord to produce new blood cells.

CONCLUSION

Based on the results of research and data analysis that has been carried out, it can be concluded that there were abnormal Hemoglobin (Hb) levels in 13 samples (92.9%), and only 1 sample (7.1%) had normal Hb levels. the lowest was 11.1 gr/dl, and the highest Hb was 14.8 gr/dl. The average value of Hb levels is 13.5-16.5 gr/dl.

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