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ANALYSIS OF HEMOGLOBIN VALUES IN CHILDREN WITH HEMOGLOBIN INFECTION

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ABSTRACT

With the development of an unhealthy lifestyle, where worms are a disease caused by a parasitic infection, worms are an infectious disease that is common in tropical and subtropical areas. The purpose of this study was to compare hemoglobin levels in orphanage children infected with single and multiple helminth infections. The population in this study were children at the Tabah Kasih orphanage, the sample determination in this study used the slovin formula where the number of samples obtained was 30 samples. Data analysis in this study used Univariate and Independent Sample T-Test. The results showed that the hemoglobin value of the children at the Tabah Kasih orphanage who were infected with helminthiasis, the minimum hemoglobin level for children infected with helminthiasis was 9.60 (g/dl).

1. INTRODUCTION

Worms are a disease caused by a parasitic infection, where parasites are small creatures that attack their host's body by attaching themselves either inside or outside. 1 More than 1.5 billion people or 24% of the world's population are infected with soil-borne helminths worldwide.

Worms are an infectious disease that is common in tropical and subtropical areas starting from 2015, based on data from the World Health Organization (WHO) more than one billion people are infected with Ascaris lumbricoides, 795 million people are infected with Trichiuris trichiura worms or 740 million people are infected with Hooworm worms. Infection is widespread in the tropics and subtropics, with widespread numbers in sub-Saharan Africa, America, China and East Asia. primary school and underprivileged population groups with limited access to sanitation. 2 - 3 The most age group is at the age of 5-14 years, 21% of them attack children of primary school age. Suriani, 2020).

The prevalence of helminthiasis in Indonesia is based on national figures (28.12%). West Sumatra (82.3%) with details of the prevalence of Ascaris lumbricodies worms 17.75%, Trichuris trichiura worms 17.74% and Hookworm worms 6.46%. A survey report on 10 provinces stated that North Sumatra Province is an area that has a high worm rate, which is in third place with a worm worm rate of 60.4% after West Nusa Tenggara (83.6%) and West Sumatra (82.3%) with details of the prevalence of Ascaris lumbricoides worms 17.75%, Trichuris trichiura worms 17.74% and Hookworm worms 6.46%. The prevalence of helminthiasis in Indonesia is a national figure (28.12%). West Sumatra Province occupies the highest level, namely (85%) (Suriani, 2020).

To achieve optimal growth and development in accordance with its genetic potential, a child needs adequate biophysic-psychosocial environmental factors. Important environmental factors include the influence of nutrition and disease. Diseases suffered by children, especially infections, will result in a lack of food intake and a lack of the child's ability to receive food, while the body's needs are increasing. This situation will result in growth disturbances, which can be seen from reduced or stopped linear growth, reduced weight gain, decreased size of the upper arm circle and decreased thickness of skin folds (Siregar, 2016).

2. LITERATURE REVIEW

Deworming

The definition of worm infection according to WHO (2011) is an infestation of one or more intestinal parasitic worms consisting of the intestinal nematode group. Among intestinal nematodes there are a

number of species that transmit through the soil or are commonly called STH worms, namely Ascaris lumbricoides, Necator americanus, Trichuris trichuira and Ancylostoma duodenale (Margono et al., 2006). These worms are generally found in tropical and subtropical areas and wet climates where hygiene and sanitation are poor. This disease is the most common infectious disease affecting economically weak groups of people and is found in various age groups (WHO, 2011).

Intestinal worm infection is a chronic infection that mostly affects toddlers and elementary school-age children. The high or low frequency of helminthiasis is closely related to personal hygiene and environmental sanitation. The worms that infect children with a high prevalence are roundworms (Ascaris lumbricoides), whipworms (Trichuris trichiura), hookworms (necator americanus) and tapeworms. If you look closely, these worms live in the human intestine. contributes greatly to the incidence of other diseases, for example malnutrition with roundworm infestations that like to eat carbohydrates and protein in the intestines before they are absorbed by the body, then anemia (lack of blood levels) because hookworms suck blood in the intestines,

Soil Transmitted Helminths (STH)

Soil Transmitted Helminths (STH) is a worm belonging to the intestinal nematode class that infects humans who ingest their eggs via the faecal-oral route. These worms consist of several types, namely Ascaris lumbricoides, Trichuris trichiura, Necator americanus and Ancylostoma duodenale (Prasetyo, 2018).

STH infection is often found in warm and humid climate areas that have poor sanitary hygiene. STH live in the intestine and the eggs will be excreted in the host's feces. If the host defecates on the ground or if the feces contain fertile eggs then the eggs will be deposited in the soil. Eggs will become infectious if the eggs are cooked (Kasimo, 2016).

Ascaris lumbricoides

*Ascrais lumbricoides*is a nematode that has a large size with a reddish white color. The morphology between male and female worms is different, male worms are 15-31cm long with a diameter of 2.4mm and female worms are 20-35cm long with a diameter of 3-6mm (Natadisastra, 2009).

A female Ascaris lumbricoides worm can produce 200 thousand eggs every day. The eggs are ovoid (ovoid) with a thick and transparent shell consisting of a lipoid membrane which is relatively non-permeable (Irianto, 2009). The adult worm Ascaris lumbricoides is the largest intestinal nematode, yellowish white to pink in color, while the dead worm is white. The shape of the body is round and elongated, both ends are sharp, the anterior part is more blunt than the posterior (Natadisastra, 2009). These worm eggs are often found in 2 forms, namely fertile eggs (fertilized) and infertile eggs (not fertilized). Fertile eggs that have not developed usually do not have an air cavity, but those that have experienced development will have an air cavity. In fertile eggs that have undergone maturation, the outer egg wall sometimes peels off so that the appearance of the egg is no longer lumpy but looks smooth (Didik, 2016).

Figure 1.Life cycle of Ascaris lumbricoides (CDC, 2013)

Eggs come out with feces, within 1-2 days the eggs will turn into rhabditiform larvae (hatching in wet soil with optimal temperature for egg growth is 23-300 C). Rhabditiform larvae feed on organisms in the soil within 5-8 days to double in size to become filariform larvae, can survive outside for up to two weeks, if within that time they do not immediately find a host, the larvae will die. 13 filariform larvae enter the host's body through the veins or lymph vessels, then the larvae will reach the right heart. From the right

heart to the lungs, then the alveoli to the bronchi, to the trachea and if a human chokes, the eggs will enter the esophagus and then into the small intestine. This cycle lasts approximately two weeksDidik, 2016).

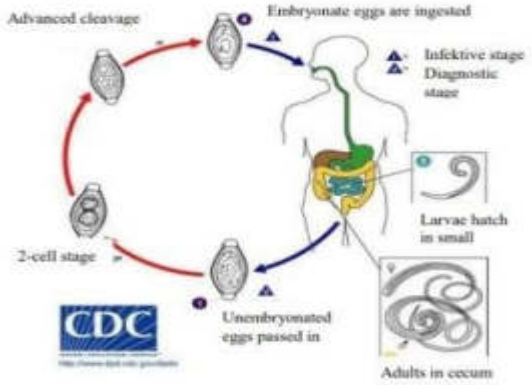

Figure 2. Trichuris trichiura Life Cycle (CDC, 2013)

Eggs that come out with the feces are eggs without embryos, immature and not infective. Once in the soil medium, the eggs develop to the embryonic egg stage and become infective within 2-4 weeks (Widoyono, 2011). Infective eggs are swallowed, then in the proximal part of the small intestine, the eggs hatch and then the larvae emerge, the adult worms will descend into the large intestine and settle for several years (Natadisastra, 2009).

3. METHOD

This type of research uses laboratory true experiment research. The research design used was the Post Test Only Control Group Design method for Tabah Kasih Orphanage children in the city of Medan. Which is valuablethe research location for stool examination was at the Prima Indonesia University Laboratory, and for Complete Blood counts it was carried out at the Siti Hajar hospital laboratory, Medan City. The population in this study were children at the Tabah Kasih orphanage on Jalan Pantai Barat Number 55, Cinta Damai, Medan Helvetia District, Medan City, North Sumatra. The samples used were blood and feces of children at the Tabah Kasih orphanage on Jalan Pantai Barat Number 55, Cinta Damai, Medan Helvetia District, Medan City, North Sumatra. The number of samples is calculated based on the slovin formula, namely:

Slovin formula: $= \frac{N}{1+Ne^2}$

Information :
N =Regulatory size
n =sample size to be sought.
e =Margin off error

$$n = \frac{33}{1+(33).(0.05)^2}$$
$$n = \frac{33}{1+(33).(0.0025)}$$
$$n = \frac{33}{1+0.0825}$$
$$n = \frac{33}{1.0825}$$
$$n = 30.48$$
$$n = 30$$

Based on this formula, the sample size needed in this study was 30 children from the Tabah Kasih orphanage.

4. RESULT AND DISCUSSION

Distribution of Sample Characteristics

The distribution of sample characteristics is based on sample information data which includes age and gender.

Table 1 Sample Characteristics By Age

Age	N	Percentage (%)
3 - 10 Years	9	30
> 10 Years	21	70
Total	30	100

Table 1 describes the characteristics of the sample based on age, a sample of 3 10 years of age is 9 people or 30%, a sample of > 10 years is 21 people with a percentage of 70% of the total sample of 30 samples.

Table 2. Characteristics of Respondents Based on Gender

Gender	N	Percentage (%)
Man	22	73,3
Woman	8	26,7
Total	30	100

Table 2 describes the characteristics of respondents based on gender, 68 female respondents with a percentage of 56.7%, 52 male respondents with a percentage of 43.3% of the total 120 respondents. The following are the results of research on the value of hemoglobin levels in children at the Tabah Kasih Orphanage without worms, which can be seen in table 3 below:

Table 3. Value of Hemoglobin Levels in Tabah Kasih Orphanage Children Without Worms

Blood Check	N	Minimum	Maximun	Means	SD
Hemoglobin (g/dl)	16	12	16.30	14,10	1.128

Table 3 describes the hemoglobin levels in the children at the Tabah Kasih Orphanage without worms, from this table it can be seen that the minimum value of hemoglobin levels for children without worms is 12 (g/dl), for the maximum value is 16.30 (g/dl) with a value the average is 14.10 (g/dl) and the standard deviation is 1.128, when viewed from the average value of the hemoglobin value in the children at the Tabah Kasih orphanage without worms is at a normal value.

Hemoglobin Levels in Orphanage Children Infected with Worms

From the results of the study showed hemoglobin and MCV levels in children at the Tabah Kasih Orphanage who were infected with helminthiasis, the minimum hemoglobin level for children infected with helminthiasis was 9.60 (g/dl), for the maximum value was 17.30 (g/dl) with average value of 13.78 (g/dl) and a standard deviation of 1.938. Furthermore, the MCV level in the Tabah Kasih orphanage infected with helminthiasis has a minimum value of 65.40 (FI), a maximum value of 80.70 (FI) with an average value of 75.10 (FI) and a standard deviation of 5.135. Worm infections are a major public health problem and cause malnutrition and cognitive impairment, with school children usually experiencing the heaviest disease burden. For each worm species the morbidity rate is related to the intensity of infection, while the morbidity rate may also be related to the number of infections of the different species.

Worms are a disease problem that still often occurs in modern times today. The progress and development of the era that is increasingly rapid does little to change a person's mindset to lead a more decent life and guarantee health. Worms are classified as neglected diseases that are commonly heard in society as diseases that are not paid enough attention to by all parties. In fact, if the disease is left alone, it even becomes chronic and without causing clinical symptoms so that the direct impact can be seen in the long term, such as growth and development disorders, loss of concentration for children and adults who are infected with helminthiasis, as well as malnutrition and cognitive impairment for children. children (Winita, 2012).

Worm infection can be caused by various intermediaries, one of which is soil media. In the soil there are many parasites that can interfere with the health of the sufferer. The parasite in question is in the form of worms which can be detrimental to health, especially for people who are always in contact with the soil, in this case are children. Therefore it is expected that the orphanage administrators will always provide

knowledge about hygiene and healthy living to the children who live in the orphanage, and also provide clean and healthy food so that the children living in the orphanage will avoid worm infections.

Comparison of Hemoglobin Levels in Children with Single and Multiple Worms

The results showed that the results of the Independent Sample T-Test test obtained a p-value of 0.145 > 0.05, which means that there was no significant difference in the comparison of hemoglobin levels between orphans infected with single worms and multiple worms. The difference in hemoglobin levels between single and multiple infected orphans was 2.19 (g/dl) where the hemoglobin level in orphanages infected with multiple worms was below the normal value.

Furthermore, for the MCV levels in children at the Tabah Kasih orphanage infected with single and multiple helminthiasis, from these results it can be seen that the average value of the MCV level in children with single worms is 76.02 (FI) and the average value of the MCV level in children with multiple worms is 69.55 (FI) with a standard deviation of 4.843 for single worms and 3.6062 for multiple worms. From the results of the Independent Sample T-Test, a p-value of 0.038 <0.05 was obtained, so it was concluded that there was a significant difference in the ratio of MCV levels between single and multiple worm-infected orphanages. The difference in MCV levels between single and multiple infected orphanages was 6.

Malnutrition is associated with parasitic infections, one of which is worm infection in endemic populations. The high prevalence of worm infection in children aged 6-19 years is associated with stunting, wasting and underweight (Silva, 2017). Moderate to severe infection intensity and infection with more than one worm are predictors of weight loss in children aged 7-10 years (Vierto, 2018). Worm infestation in the intestine will cause a negative nitrogen balance which if it occurs continuously will result in malnutrition which can cause growth disorders. This situation occurs when food intake is insufficient for parasites and hosts (De Gier et al. 2016).

Worm infections affect the intake, digestion, absorption, and metabolism of food which can result in the loss of large amounts of protein, carbohydrates, fats, vitamins and blood, also cause immune response disorders, decrease in plasma insulin like growth factor (IGF)-1, increase tumor necrosis factora (TNF) serum levels and reduced hemoglobin concentrations. In addition, it can cause various symptoms of diseases such as anemia (Silva, 2017). The results of this study are the same as Vierto's study, (2018) which showed that there was an average difference in hemoglobin levels in children who were positive for helminthiasis and negative for helminthiasis.

Large Percentage of Occurrence of Iron Deficiency Anemia in Orphanage Children Who Are Infected by Worms

The results showed that in the orphanage infected with worms, there were 4 children with iron deficiency anemia with a percentage of 28.6% consisting of 2 children infected with single worms and 2 children infected with multiple worms. Furthermore, for children who do not experience iron deficiency anemia, there are 10 people with a percentage of 71.4%. Anemia is a condition or condition characterized by a decrease in hemoglobin (Hb) levels, hematocrit or red blood cell count. Hb and blood cell levels vary depending on age, gender, altitude of a place, and certain physiological conditions (Alfiah, 2021).

Hb levels are influenced by many factors, originating from the individual, household, and community levels (Allali, 2017). Prevention of anemia in children remains one of the main public health agendas in most developing countries, including Indonesia. WHO has outlined important public health and nutrition interventions to reduce the childhood burden of anemia, most of the WHO anemia prevention and control recommendations have been included in National Nutrition Programs and Strategies (Shimels, 2019).

5. CONCLUSION

The hemoglobin value for children at the Tabah Kasih Orphanage who are infected with helminthiasis, the minimum value for hemoglobin for children infected with helminthiasis is 9.60 (g/dl), for the maximum value is 17.30 (g/dl) with an average value of 13, 78 (g/dl) and a standard deviation of 1.938. For the MCV levels in the Tabah Kasih Orphanage children infected with worms, the minimum value was 65.40 (FI), the maximum value was 80.70 (FI) with an average value of 75.10 (FI) and a standard deviation of 5.135. There was no significant difference in the comparison of hemoglobin levels between orphans infected with single worms and multiple worms. The difference in hemoglobin levels between single and multiple infected orphans was 2.19 (g/dl) where the hemoglobin level in orphanages infected with multiple worms was below the normal value.

There is a significant difference in comparison of MCV levels between single and multiple helminth-infected orphanages. The difference in MCV levels between single and multiple infected orphans was 6.47 (FI) where the MCV levels in single and multiple worm-infected orphanages were below the normal value with MCV values far below the normal value found in infected orphans multiple worms. In the orphanage infected with worms who had iron deficiency anemia there were 4 people with a percentage of 28.6% consisting of 2 children infected with single worms and 2 children infected with multiple worms. Furthermore, for children who do not experience iron deficiency anemia, there are 10 people with a percentage of 71.4%.

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