

# Worms Infection Related to various factors among Elementary School Muhammadiyah 25 Students in Medan, Indonesia

*by* Lukito Alamsyah

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# Worms Infection Related to various factors among Elementary School Muhammadiyah 25 Students in Medan, Indonesia

Marzuki Samion <sup>1</sup> , Alamsyah Lukito <sup>2</sup>

1) Lector at Faculty of Medicine, UISU, e-mail : marzuki.samion@fk.uisu .ac.id

2) Lector at Faculty of Medicine, UISU, e-mail : alamsyahLukito@yahoo.com

## Chapter I

### INTRODUCTION

#### 1.1 Background.

Worm infection is <sup>19</sup> one of the public <sup>11</sup> health problems in Indonesia, which is still high in prevalence, especially in the age <sup>3</sup> group of children under five and primary school age children, especially in rural areas and urban slums. (Mardiana and Djarismawati, 2008).

Worm disease is one of the diseases related to the environment, because the source of this disease can be transmitted through soil or called Soil Transmitted Helminths. The types of worms that are often found <sup>3</sup> are *Ascaris lumbricoides*, *Necator americanus*, *Ancylostoma duodenale*, *Trichuris trichiura*, *Strongyloides stercoralis* and several species of *Trichostrongylus* (Utama, 2009).

The high morbidity of infectious diseases in Indonesia is strongly influenced by the physical and biological environment. For example infectious diseases due to bacteria, viruses, parasites, generally thrive in a humid and polluted tropical climate (Zulkoni, 2010).

School-age children are groups that are expected to grow into potential human resources in the future and need to be considered and prepared to grow perfectly both physically and intellectually. This age group is often in contact with land which is a medium of disease that often causes health problems (MOH RI, 2008).

The disease is the most common infectious disease that attacks weak economic groups and is found in various age groups. How this worm infection can occur through several pathways, namely infective eggs into the mouth along with contaminated food

and drinks, through dirty hands contaminated especially in children, or infective eggs inhaled through the air with dust (Soedarto, 2008).

More than 1.5 billion people, or 24% of the world's population, are infected by worms due to direct contact with the soil. Infection is widespread in the tropics and subtropics, with the largest number occurring in sub-Saharan Africa, America, China and eastern Asia. More than 270 million preschoolers and more than 600 million school-age children live in areas where these parasites are intensively transmitted, and need treatment and preventive interventions. (WHO, 2014).

The prevalence of intestinal worms in Indonesia is generally still very high, especially in the poorer population groups who have a high risk of contracting this disease. Based on the Directorate General of Indonesia CDC-EH (2013) the target prevalence of helminthiasis in Indonesia is 20%. According to (MOH, 2008) the prevalence of helminthiasis in Indonesia is still relatively high at 32.6% and is dominated by *Ascarislumbricoides*, *Trichuristrichiura*, Hookworm, *Strongyloides*, *Necaturamericanus*. In the Daulay (2008) study the rate of helminthiasis infection in elementary school students in the city sibolga in the year was 55.8%. The results of Fitri's study (2012) showed that out of 100 elementary school children in grade III, IV and V at SDN 100400 Palsabolas and SDN 100570 Pargarutan, which were laboratory-inspected for feces, 60% of students were positively infected with helminthiasis and 40% were negatively infected with worms. In North Sumatra, especially in Medan, the prevalence of helminthiasis in children is around 60-70% of all cases (Daulay,2010).

Based on the above phenomenon, the authors are interested in conducting a study on "The Relationship of Worm Infection Causing factors in Muhammadiyah 25 Elementary School Children Medan Tembung 2018".

## 1.2 Problem Formulation

The formulation of the problem in this study is the relationship of the factors that inflicts helminthiasis in the children of Muhammadiyah 25 Elementary Echool Medan Tembung 2018.

## 1.3 Study Objectives

### 1.2.1 General Purposes

To know the relationship of the factors that inflicts helminthiasis in Elementary School Children Muhammadiyah 25 Medan Tembung 2018.

#### **1.2.2 Specific Purposes**

1. To find out, the distribution of worm infections at the age of 7-12 years old Students at Muhammadiyah 25 Medan Elementary School Tembung.
2. To find out, the frequency distribution of risk factors for worm infection in Muhammadiyah 25 Elementary School Students Medan Tembung.

#### **1.4 Benefits of Study**

1. For the study sites, this study is useful to provide input and consideration in addressing helminthiasis problems in children at Muhammadiyah 25 Elementary School in Medan Tembung.
2. For the respondents, this study is useful to increase knowledge and insight into the causes of intestinal worms so that they can use this research information as a reference in the prevention and handling of intestinal worms appropriately.
3. For the researcher, be able to increase knowledge and open insight into thinking and can improve the way to conduct the study better.

## Chapter II

### LITERATURE REVIEW

#### 2.1 Definition of intestinal worms

Worms (or often called as helminthiasis) are endemic and chronic diseases caused by parasitic worms with high prevalence, are not lethal, but undermine the health of the human body resulting in decreased nutritional conditions and community health. Worms that are popular today are roundworms (*Ascaris lumbricoides*), pinworms (*Oxyuris vermicularis*), tapeworms (*Taenia solium*), and hookworms (*Ancylostoma duodenale*).

#### 2.2. Epidemiology of Soil Transmitted Helminthes

Humans are the host of several intestinal nematodes. Most of these menatodas cause health problems for the community in Indonesia. Among intestinal nematodes there are a number of species transmitted through soil and are called the most important "soil transmitted helminthes" for humans, namely *Ascaris lumbricoides*, *Necator americanus*, *Ancylostoma duodenale*, *Trichuris trichiura*, *Strongyloides stercoralis* and several species of *Trichostrongylus* (Gandahusada, et. al, 2008).

##### 2.2.1. *Ascaris Lumbricoides*

###### a. General Name

Humans are the only *Ascariasis lumbricoides* host. Disease caused by it is called as "ascariasis".

###### b. Habitat

Adult worms are found in the small intestine, but sometimes are found wandering in other parts of the intestine, the definitive host is human, but it is thought to be a zoonotic disease that lives in pig intestines.

###### c. Life cycles

Fertilized worm eggs that come out with the patient's stool, in moist soil and optimal temperatures will develop into infective eggs, which contain worm larvae.

Infection occurs with the infective egg entry into the mouth through food or contaminated ground drinks containing feces of ascariasis sufferers. In the small intestine the upper part of the egg wall will break so that the larvae can come out, then penetrate the small intestine wall and enter the portal vein of the liver. Together with venous blood flow, the larvae will circulate towards the heart, lungs, then penetrate the capillary wall into the alveoli. This migration period lasts around 15 days.

From the alveoli the worm larvae crawl into the bronchi, trachea and larynx, to then enter the pharynx, esophagus, down to the stomach and finally to the small intestine. After changing the skin, the worm larvae in the blood are called "lung migration". A female worm starts to be able to lay eggs, which can produce 200,000 eggs per day.

#### **d. Ways of infection**

Transmission of ascariasis can occur through several pathways, namely infective eggs entering the mouth with contaminated food and drinks, through dirty hands contaminated especially in children, or infective eggs inhaled through the air with dust. In this latter condition, the eggs hatch in the mucosa of the upper airway, the larvae immediately penetrate the blood vessels and circulate with the bloodstream.

#### **e. Pathogenesis**

Adult worms that are in the intestines and larvae of worms that circulate through the bloodstream, cause pathological changes in patients. Migration of worm larvae in the lungs can cause pneumonia with symptoms such as fever, cough, tightness and bloody phlegm. Patients also experience urticaria and an eosinophilic picture of up to 20 percent. Pneumonia accompanied by allergic symptoms is referred to as Loeffler Syndrome or Ascaris pneumonia

<sup>5</sup> In severe infections (superinfection), especially in children can occur digestive disorders and protein absorption so that patients experience growth disorders and anemia due to malnutrition.

Worm body fluids that are toxic can cause <sup>5</sup> symptoms similar to typhoid fever, accompanied by signs of allergies such as urticaria, facial edema, conjunctivitis and upper respiratory irritation.

<sup>5</sup> In humans, adult worms can cause a variety of mechanical consequences, namely intestinal obstruction, intussusception, and ulcer perforation in the intestine. In addition, adult worms can migrate to organs outside the intestine (ectopic ascaris), for example to <sup>5</sup> the stomach, oesophagus, mouth, nose, glottis or bronchi, thus blocking the breathing of patients. Can also occur bile duct obstruction, appendicitis, liver abscess, and acute pancreatitis.

#### **f. Diagnosis**

The exact diagnosis of ascariasis is established if through macroscopic examination of stools or vomit the patient is found in adult worms. Through microscopic examination, <sup>1</sup> worm eggs can be found that are typical in the feces or bile of sufferers. To help diagnose intestinal ascariasis and organ ascariasis, a radiographic examination with barium can be performed. Blood tests show eosinophilia at the beginning of infection, or do a scratch test on the skin.

#### **g. Therapy**

New worm medicines are effective, and only cause a few side effects are mebendazol, pirantel pamoat, albendazole and levamisole. Piperacin and various other worm drugs can still be used to treat people with ascariasis.

#### **h. Prevention**

Implementing good environmental health principles, for example making good latrines to avoid contaminating the soil with sufferers' feces, preventing the entry of worm eggs that pollute food and drinks by always cooking food and drinks before eating or drinking, and maintaining personal hygiene.

Treating patients and treatment for example with wide-spectrum worm medicine in endemic areas can break the chain of the life cycle of this worm and other worms. Health education for residents needs to be done to support efforts to prevent the spread and eradication of ascariasis.

### 2.2.2. Hookworm

In humans there are several hookworms that can cause disease in humans. Adult worms *Ancylostoma Duodenale* causes ankylostomiasis, adult worms *American originator* causes nekatoriasis, *ancylostoma braziliensis* larvae and *Ancylostoma Caninum* larvae both cause dermatitis (creeping eruption). Hookworm consists of *Ancylostoma duodenale* and *Necator americanus*.

#### a. Habitat

Adult worms live in the intestine, especially in the jejunum and duodenum of humans by attaching themselves to the mucous membrane using their teeth, and sucking blood that comes out from minor injuries.

#### b. Geographical Distribution

The spread of these worms throughout the equator and elsewhere with appropriate conditions, for example in mining and plantation areas. Prevalence in Indonesia is high, especially in rural areas. Between 1972-1979 the prevalence in various rural areas in Indonesia was around 50%. In a survey survey conducted by the Ministry of Health in ten provinces in Indonesia between 1990-1991 only 0-24.7% were obtained while the prevalence of 6.7% was found in the examination of 2478 elementary school children in North Sumatra ..

#### c. Larva

In its life cycle, hookworms have two larval stages, namely non-infective rhabditiform larvae and infective filariform larvae. The rhabditiform larva is rather fat with a length of about 250 microns, and slim filariform larvae with a body length of about 600 microns.

#### d. Life Cycles

Humans are the only definitive host of *N. americanus* and *A. duodenale*. Eggs that come out of the intestine of the patient within two days will grow on the

ground into rabbitiform larvae (not infective). After changing the skin twice, rabbitiform larvae within one week will develop into infective filariform larvae.

Filariform larvae will penetrate healthy human skin, enter blood vessels and lymph, circulate in the bloodstream, enter the right heart, then enter the pulmonary capillaries. Larvae penetrate the capillary wall into the alveoli. The worm larvae then migrate to the bronchi, trachea, larynx and pharynx, so that they are finally swallowed into the esophagus.

In the esophagus the larvae change skin for the third time. Larva migration lasts about ten days. From the esophagus the larvae enter the small intestine, change their skin for the fourth time, then grow into adult worms. Within a month, female worms are able to lay eggs.

#### **e. Pathogenesis**

Clinical symptoms caused by adult worms and larvae. Adult worms suck the blood of sufferers. An adult *N. americanus* causes blood loss of about 0.1 cc per day, whereas an *A. duodenale* worm can cause blood loss up to 0.34 cc per day (Soedarto, 2008).

Microciter hypochromic anemia usually occurs. Besides that there is also eosinophilia. There is no evidence of toxins that cause anemia. Usually does not cause death, but decreases endurance and decreased work performance (Gandahusada, et al., 2006).

The worm larvae cause dermatitis with itchy itching (ground itch) when penetrating the patient's skin. Besides the larvae when circulating in the blood (lung migration) will cause bronchitis and mild allergic reactions (Soedarto, 2008).

According to Noerhajati, a number of sufferers of hookworm disease treated in Yogyakarta have lower hemoglobin levels if the disease becomes more severe. Mild, moderate, severe, and very heavy groups have Hb levels averaging 11.3 g%; 8.8 g%; 4.8 g%; and 2.6 g% (Gandahusada, et al., 2006).

#### **f. Diagnosis**

The exact diagnosis of hookworm infection is determined by microscopic examination of feces to find worm eggs.

The clinical picture of hookworm infection that appears can be:

1. Hypochromic microcytic anemia
2. General description of lack of blood: pale, distended stomach, dry hair and easy to loose
3. Discomfort in the epigastrium
4. Constipation, diarrhea
5. Ground-itch (itching of the skin at the entry point of worm larvae)
6. Symptoms of bronchitis: coughing, sometimes bloody phlegm.

The differential diagnosis for hookworm infection is disease:

1. Other causes of anemia
2. Tuberculosis
3. Causes of stomach disorders

Blood tests show an illustration:

4. Hemoglobin, decreased <11.5g / dl (female) <13.5 g / dl (male).
5. MCHC (Mean Corpuscular Hemoglobin Concentration), less than 31-36 g / dl.

Bone marrow examination shows a picture of hyperplasticoblastic.

On blood smear, there is an illustration:

1. Hypochromic microcytic
2. There is leukopenia with relative lymphocytosis. Leukocyte count is less than 4,000 / ml.
3. Eosinophilia, can reach 30%.
4. Anisocytosis, or poikilocytosis

#### **g. Treatment**

Treatment is intended to overcome anemia and to eradicate worms, namely:

1. Anemia therapy uses iron preparations, which are given orally or parenterally.
2. Folic acid is given, if megaloblastic anemia occurs.
3. Worm drugs given orally are mebendazole, albendazole, levamisole, and pyrantel.
  - a. Mebendazole: adult and child dose above 2 years, 2 x 100 mg / day for 3 days. If necessary, it can be repeated after 3 weeks.

- b. Albendazol, a single dose of 400 mg.
- c. Lavemisol, especially if multiple infections occur with ascariasis. Single adult dose, 120 mg and single dose of children 2.5 mg / kg body weight.
- d. Pyrantel, single dose of 10 mg / kg body weight.

#### **h. Prevention**

To prevent new infections and reinfection, has to carried out:

1. Mass treatment and individuals with worm medicine
2. Health education: making good latrines, and walking on the ground always use footwear (Soedarto, 2008).

### **2.2.3. Trichuris trichiura**

#### **a. General Numeration**

Because the shape is like a whip, this worm is often referred to as a whip worm.

#### **b. Habitat**

Adult worms attach to the intestinal mucosa of the patient, especially in the cecum and colon area, by immersing his head in the intestinal wall. Sometimes this worm is found living in the appendix and ileum in the distal part.

#### **c. Life cycle**

Infection occurs when humans swallow an infective worm egg, after the egg has matured in the soil within 3-4 weeks. In the small intestine the wall of the egg breaks and the larvae of the worm go out to the cecum and then develop into adult worms. One month after infective egg entry into the mouth, the adult worms that occur have begun to be able to lay eggs. Adult worms can live several years in the human intestine.

#### **d. Pathogenesis and clinical symptoms**

Adult worms that penetrate the intestinal wall cause trauma and damage to intestinal tissue. In addition, worms produce toxins that cause irritation and inflammation.

In mild infections with several worms, there are no symptoms or complaints from the patient. But in severe infections, patients will experience symptoms and complaints in the form

1. Severe anemia with hemoglobin which can be less than three percent
2. Bloody diarrhea
3. Abdominal pain
4. Nausea and vomiting
5. Weight loss
6. Sometimes prolapse of the rectum through proctoscopy can be seen by the worms of adult worms in the colon or rectum of the patient.

Blood tests for severe infections, hemoglobin can be below 3 g% and show eosinophilia (eosinophils > 3%). Examination of stool can find a typical worm egg shape.

In 1976, the parasitology department of FKUI reported 10 children with severe trichuriasis, all of whom suffered chronic diarrhea for 2-3 years. Now severe cases of trichuriasis have never been reported again in Jakarta.

Severe infections of *Trichus trichiura* are often accompanied by infection with other worms or protozoa. Mild infections usually do not provide clear clinical symptoms or are completely asymptomatic; This parasite is found in urine stool examination.

#### **e. Diagnosis**

To make a definitive diagnosis, a stool examination is performed to find a worm egg that is typical in shape. In severe infections proctoscopy can show the presence of adult worms in the rectum of the patient.

#### **f. Treatment**

It is best to give a combination of worm medicines, namely:

1. Pirantel pamoat (10 mg / kg body weight) and oxantel pamoat (10-20 mg / kg body weight / day) which are given together in the form of a single dose, or
2. Combination of Mebendazole and pirantel pamoat.
3. Giving one type of medicine can be given:
4. Mebendazole with a dose of 2 x 100 mg / day for 3 consecutive days;
5. Levamisole can be given with a single dose of 2.5 mg / kg body weight / day.
6. If there is anemia, iron preparations are provided accompanied by improvement in patient nutrition.

### g. Prevention

Prevention of trichuriasis transmission is carried out through patient treatment or mass treatment for prevention of reinfection in endemic areas. Improving personal and environmental sanitation in order to avoid environmental pollution by sufferers' feces, such as making toilets or latrines that are good in every house. Cooking food and drinks properly can kill infective eggs of worms (Soedarto, 2008).2.2.4. Strongyloides stercoralis

The threadworm that causes strongyloidiasis is a zoonotic worm that is widespread in tropical areas with high humidity.

Adult female worms live parasitically in the mucous membranes of the small intestine, especially in the duodenum and jejunum areas of humans and some types of animals. Male worms are rarely found in the definitive host intestine.

#### a. Life cycle

To complete the life cycle of this worm does not require an intermediate host. The definitive host where adult worms live is human, while some types of animals can act as reservoir hosts so that it is also a source of transmission to humans. Worm eggs that are released by the parent worms in the intestinal mucosa, will soon hatch into rhabditiform. Then these larvae will develop through three lifecycle paths, namely:

1. Autoinfection. In the intestine, rhabditiform larvae turn into filariform larvae, which then penetrate the intestinal mucosa and develop into adult worms.
2. Live life cycle. Rhabditiform larvae along with the patient's feces fall to the ground, grow into infective filariform larvae. If you penetrate the skin of the host, lung migration will occur, and then develop into adult worms in the intestine of the patient.
3. Indirect life cycle. Rhabditiform larvae together with the patient's feces fall to the ground, develop into adults who live freely (free living) on the ground, then give birth to rhabditiform larvae. This rhabditiform larvae in the soil grow into filariform larvae which infectively penetrate the skin of the host, followed by

lung migration, then grow and develop into adult worms in the patient's intestine.

#### **b. Pathogenesis**

Pathological abnormalities are caused by larvae or by <sup>1</sup>adult worms. The worm larvae penetrate the skin at the time, causing dermatitis accompanied by urticaria and pruritus. If the larvae carry out a large number of pulmonary migrations, it can cause pneumonia and haemoptoe

Adult worms in the intestinal mucosa can cause bleeding diarrhea that can be accompanied by tenders. Mild infections with strongyloides generally occur without the host knowing because they do not cause symptoms.

Moderate infections can cause pain such as stabbing in the middle epigastric region and not spreading. There may be nausea and vomiting; diarrhea and constipation alternately. In strongyloidiasis there is the possibility of autoinfection and hyperinfection. In hyperinfection, adult worms that live as parasites can be found throughout the digestive tract and the larvae can be found in various internal organs (lung, liver, gall bladder). Often found in people who experience impaired immunity and can cause death.

On blood tests eosinophilia or hyperesinophilia may be found, although in many cases the number of eosinophil cells is normal.

#### **c. Diagnosis**

Clinical diagnosis is uncertain because strongyloidiasis does not provide real clinical symptoms. The definitive diagnosis is to find rabditiform larvae in fresh stool, in culture or in duodenal aspiration. Fecal cultures for at least 2x24 hours produce filariform larvae and free-living Strongyloides stercoralis adult worms.

#### **d. Treatment**

Formerly tiabendazole was the drug of choice at a dose of 25 mg per kg of body weight, one or two times a day for 2 or 3 days. Now albendazole 400 mg once / twice a day for three days is the drug of choice. Mabendazole 100 mg three times a day for two or four weeks can produce good results. Treating people who contain parasites, although sometimes asymptomatic is important considering

autoinfection can occur. Special attention is paid to cleaning around the anal area and preventing constipation.

**e. Prognosis**

In strongyloidiasis severe infections can cause death.

**2.3. Factors that cause helminthiasis**

**2.3.1. Personal Hygiene**

Personal hygiene or personal hygiene is a person's effort to <sup>2</sup> maintain and improve their own health, such as maintaining the cleanliness of nails, hands, feet, hair, eating healthy food, how to live regularly, increasing endurance and physical health, avoiding diseases, improve intelligence and spiritual level, equip homes with facilities that guarantee healthy living and health checks (Entjang, 2010). Prevention and eradication of worm disease in general is the termination of the <sup>6</sup> chain of transmission, which is one of them by practicing personal hygiene. Personal hygiene includes:

**a. Nail hygiene**

Nail hygiene can be related to worm infections, where <sup>4</sup> long and dirty nails can become a place for attaching various impurities containing microorganisms, one of which is worm eggs. The worm egg can be tucked inside the nail, then it can enter the body if swallowed. This can be compounded if it is not used to washing hands with soap and running water before eating (Jalaluddin, 2009). Research by Faridan, et al. (2013) found that respondents with dirty nails were 1.7 times more likely to suffer from worms than clean-nosed respondents.

These results <sup>2</sup> are in line with the study of Fitri, et al. (2012) who found an <sup>4</sup> association between nail hygiene and worm infection in elementary school students ( $p = 0,000$ ). The growth of fingernails in 1 week averages 0.5 to 1.5 mm, four times faster than the growth of toe nails (Onggowaluyo, 2008). Nails should be cut until they are always short and cleaned until there is no dirt to avoid worm

transmission from hand to mouth (Gandahusada et al., 2008). According to The Joint Commission (2009), nails that meet health requirements have a length that does not exceed 0.5 cm from the fingertips and there is no dirt under the nails.

#### **b. Habits of using footwear**

The habit of using footwear is the activity of using footwear in the form of sandals or shoes when outside the home, especially when going to contact with the ground. Sumanto's (2010) study in Demak showed an association between the habit of wearing footwear during outdoor activities and the incidence of hookworm infection ( $p = 0.003$ ). The study was supported by Muchlisah's study, et al. (2014) which showed an association between the habit of wearing footwear and the incidence of worms ( $p = 0,000$ ) in elementary school children at Athirah Bukit Baruga, Makassar. The habit of not wearing footwear outside the home, especially when stepping on the ground, can cause the feet to come into direct contact with worm eggs which can then result in the entry of worm eggs into the skin pores (Sumanto, 2010).

#### **2.3.2 Environmental Effects on Worms and Health**

Environmental factors are the factors that have the greatest influence on improving public health status, in addition to other factors, namely behavioral factors, service factors and heredity.

The environment includes all aspects outside of human agents, because it is very diverse and generally classified into three categories, namely those relating to physical, biological and socio-economic aspects. Disease arises if there is a disruption of the balance (kuspuputranto, 2010).

In terms of environmental health science, disease occurs because of the interaction between humans and their environment, which is a natural process that has been carried out since humans were born to death. This is because humans need the carrying capacity of environmental elements for their survival. However, in the process of human interaction with the environment it is not always advantageous, sometimes humans suffer losses from human activities with that environment. (soemirat, 2009).

### 2.3.3 Feces and health

Fecal discharge is the most important part of environmental health. In some countries, proper disposal of feces is an urgent public health need. Non-sanitary disposal of human feces can cause contamination of ground water and clean water sources. This condition causes disease agents to multiply and spread infection to humans.

Poor disposal of feces is often associated with a lack of clean water supply and other health facilities. These conditions will have an impact on health and make it difficult to assess the safety of each component in the transmission of the disease. It is well known that there is a relationship between the disposal of feces and the health status of the population both directly and indirectly. Direct effects, for example, can reduce the occurrence of certain diseases that can be transmitted because contamination with feces can reduce the occurrence of certain diseases that can be transmitted due to contamination with feces eg abdominal typhus, cholera, dysentery bacillus and amoeba, ascariasis, infectious hepatitis and parasitic infections others.

### 2.3.4 Healthy latrine requirements

Human dirt (feces) can contain various kinds of pathogenic organisms, water, food, flies / insects which are the same as transmissions to people and can cause disease for people who have endurance. To find out the possibility of the occurrence of the problem of transmission of disease through means of disposal of feces that meet health requirements. Disposal of feces that meet health requirements is as follows (Sembiring 2010):

1. Does not pollute the soil surface.
2. It must not pollute the ground water level
3. It must not pollute the surface water supply
4. Dirt should not be opened so that it is not used by insects to lay eggs and does not cause odor
5. The latrine must be able to protect users from outside influences
6. Disposal is easy, cheap and meets the requirements
7. Acceptable by the local community.

### **2.3.5 Latrine Types**

In general, the disposal of feces / human feces is strongly influenced by geography, socio-economic conditions and habits of the people. Some types of latrines are (Sembiring, 2010):

#### **1. Pit Privy**

Pit Privy latrine is a form of fecal discharge where a hole in a fecal reservoir is made by digging a hole from a diameter of about one meter in diameter with a depth of 2.5-8 m. Hole walls can be made to hold (walls) to not easily collapse and are usually made on soil where the groundwater layer is deep (> 3 m). Seats / squats are above the toilet pit and do not use the swan neck (bowl) shape. when the toilet hole is almost full, the hole can be buried with soil, so the location of the hole can be buried elsewhere.

This construction is lack of hygiene because it can cause odor and still allow interference with flies or insects, for this type of correction can be corrected for the above weaknesses, namely:

- a. Make a toilet house
- b. Make a toilet cover hole
- c. Try to keep the surface of the latrine dry
- d. Doing a toilet / toilet house is a bit far from the residence.

#### **2. Empty toilet (Latrine Overhung)**

The pond latrine is a toilet that is made on a pond, river or swamp where dirt directly into pond or river water and others.

This toilet has a negative effect, so the conditions need to be done:

- a. Pond water should not be used as a source of drinking water.
- b. The water in the pool is never dry
- c. The pond / pond must be large enough and always be exposed to direct sunlight.
- d. The toilet must be built in such a way that the stools fall in the water.
- e. The fish in the pond should not be eaten raw or half cooked.

- f. Safe to use especially in children.
- g. There is no source of drinking water / wells that are less than 10 meters away.
- h. There are no water plants that grow on pond water or shade trees that protect the pond.

### **3. Drill latrine (Bored Hole Laterine)**

Drill latrine is a form of disposal of feces whose shape is the same as a cubluk, only the hole size is smaller and usually the use is temporary and if it is finished, it is immediately back up. Terms that must be met:

- a. Maintain a distance of more than 10 meters from the source of drinking water.
- b. The toilet hole must have an insulator / insulator.
- c. When it is almost full, it is immediately covered with land and the location is moved.

### **4. Watery Cups (Aqua Privy)**

A watery cup is a form of toilet where a cup / stool shelter is made with water-resistant construction where the stool is always filled with water so it will break down in water and then settle down.

### **5. Goose Trine (Water Sealet Laterine)**

This trine goose toilet is not a separate toilet type, but is a change in the shape of the seat (bowl) which is the shape of a goose neck that can store water as a cover of the relationship between the outside and shelter / disposal, this form can be made on a variety of latrines other. For this type, it requires enough water to push the feces collected in the bowl.

- a. Goodness - kindness
  - 1. Can avoid or reduce the interference of flies and other insects.
  - 2. Can reduce odor.
  - 3. Can be used safely by children.

4. Cleanliness of latrines is easily maintained.
5. Can be built inside or outside the house.

b. Difficulties that may arise

For people who have never or are not used to using latrines, it takes time to adjust / get used to using it.

**6. Bucket latrine**

This latrine is formed where the feces shelter is made from a bucket shape and when finished using the stool is disposed of elsewhere.

**7. Septic Tank latrine**

The septic tank is a toilet that uses the method by which all the dirt is channeled into the tank which is made specifically where is inside the stool can be a process of bacterial destruction and decay, this type of toilet is the ideal type of toilet.

### CHAPTER III

#### FRAMEWORK CONCEPT AND OPERATIONAL DEFINITIONS

##### 3.1 Framework Concept

Based on the study objectives described in the previous chapter, the research conceptual framework can be described as follows.

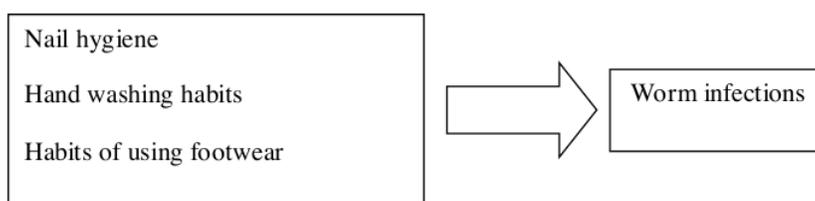


Figure 2.4 Study of Framework Concept

##### 3.2 Operational Definition

No	Variable	Operational Definition	Measuring and measuring instruments	Measuring Results	Scale
1.	Helminthiasis	Parasitic infections caused by invading worms	Questionnaire	1. Yes 2. No	Ordinale
2.	Gender	A person's physical features show differences between boy and girl	Questionnaire	1.Boys 2.Girls	Ordinale
3.	Hand washing habits	One of the actions of personal hygiene by cleaning hands and fingers using water or other liquids by humans in order to be clean	Questionnaire	1. Yes 2. No	Ordinal

4.	Habits of using footwear	The habit of respondents using footwear in the form of slipper or shoes every activity outside the home	Questionnaire	1. Yes 2. No	Ordinale
5.	Nail hygiene	Cut nails & clean regularly so that there is no black dirt around the nail even though the nail is short	Questionnaire	No = 2 Yes= 1	Ordinale

## CHAPTER IV STUDY METHODS

### 4.1 Design of Study

This type of research is an analytic observational study using a cross sectional design approach, measurements or observations carried out at the same time.

### 4.2 Location and Time of Study

#### 4.2.1 Location of Study

The research was conducted at Elementary School Muhammadiyah 25 Medan Tembung.

#### 4.2.2 Time of Study

This research took place in November 2018.

### 4.3 Population and Sampling of the Study

#### 4.3.1 Population of Study

The population in this study were all students of Muhammadiyah 25 Medan Tembung Elementary School who had a history of helminthiasis.

#### 4.3.2 Sampling of Study

The samples taken in this study were students who had a history of intestinal worms. The researcher applied the inclusion and exclusion criteria to ascertain whether the samples taken could meet the research criteria.

There were also inclusion criteria in this study:

1. Students of Muhammadiyah Elementary School 25 Medan Tembung who are willing to become respondents until the end of the study.
2. Students of Muhammadiyah Elementary School 25 Medan Tembung who have a history of intestinal worms.

There are also exclusion criteria in this study:

1. Incomplete data.
2. Not willing to be a respondent.

The calculation of the number of samples of this study is to use total sampling. Total sampling is a sampling technique if all members of the population are

used as samples (Sugiyono, 2014). So that the research sample that meets the criteria are 21 samples.

#### **4.4 Variable of the Study**

1. Independent variables (free) in this study are skin hygiene, dental hygiene, cleanliness of nails, hands and feet.
2. The dependent variable in this study is worm infection.

#### **4.5 Instrumen of the study**

The research instrument is the primary data in the form of a questionnaire at the Muhammadiyah 25 Medan Tembung Elementary School in November 2018

#### **4.6 Data Processing & Analysis**

##### **4.6.1 Data Processing**

After the data is obtained through a questionnaire, the processing phase is carried out as follows:

a. Data Selection (Editing)

At this stage the author conducts research on the data obtained then investigates whether there is a mistake.

b. Giving Code (Coding)

After editing, then provide a specific code on each data so that it is easier to do data analysis.

c. Tabulating

To simplify data analysis, manage data, and draw conclusions, data is entered in the frequency distribution table.

d. Entering Data (Processing)

Data that has been changed in code form is then entered into the SPSS program.

e. Cleaning

Rechecking of all data that has been entered into the SPSS program to avoid errors in entering data.

#### 4.6.2 Data Analysis

##### a. Univariate Analysis

Univariate analysis shows a table of distribution of independent variables and dependent variables from the results of the data studied. Independent variables (free) are skin hygiene, dental hygiene, cleanliness of nails, hands and feet. The dependent variable in this study is worm infection.

##### b. Bivariate Analysis

Linking between intestinal infection with skin hygiene, dental hygiene, cleanliness of nails, hands and feet. The statistical test used is the Chi-Square test to see the relationship between the dependent variable and the independent variable with a significance level of  $P = 0.05$ . If the value of  $P > 0.05$  means that there is a relationship between the two variables and  $P < 0.05$  means that there is no relationship between the two variables.

## CHAPTER V

### STUDY RESULTS AND DISCUSSION

#### 5.1 Study Results

##### 5.1.1 Location of Study

This research was conducted at the Muhammadiyah 25 Medan Tembung Elementary School in 2018 with a sample of 21 students. This school is located at Jalan Pukat I No. 19 in Bantan Timur Village, Medan Tembung Subdistrict, North Sumatra Province. This school has Grade B accreditation with a land area of 200 m<sup>2</sup>. This school has a total student population of 234 students.

##### 5.1.2 Univariate Test Results

###### a. Data Distribution of Age Frequency

Based on the results of the study found the frequency of age of 21 students of class I-VI Muhammadiyah Elementary School 25 Medan Tembung In 2018, 7 years old were 2 students (9.5%), 8 years old 6 students (28.6%), 9 years old 5 students (23.8%), 10 years old 5 students (23.8%), and 12 years old 13 students (14.3%). (table 1)

Table 1. Data Demographic of Age

No.	Age ( Year)	Frequency	Procentage (%)
1	7	2	9.5
2	8	6	28.6
3	9	5	23.8
4	10	5	23.8
5	12	13	14.3
	Total	21	100

### b. Data Distribution of Gender Frequency

Based on the results of the study it was found that the frequency of students who male were 15 students (71.4%), and female were 6 students (28.6%).

Table 2. Data Demography of Gender

No	Gender	Frequency	Percentage (%)
1	Male	15	71.4
2	Female	6	28.6
	Total	21	100

### c. Data Distribution Frequency of Risk Factor

Based on the results of the study it was found that the frequency of students who did not maintain nail hygiene were 13 students (71.4%), who had poor hand washing habits were 5 students (23.8%), and those who did not use footwear were 3 students (14.3%).

Table 3. Frequency of Risk Factor

No.	Risk Factor	Frequency	Percentage (%)
1	Nail Hygiene	13	61.9
2	Hand washing habits	5	23.8
3	Using Footwear	3	14.3
	Total	21	100

#### 5.1.3 Bivariate Test of Result

Data were carried out bivariate test using the chi-square method. The results obtained in the chi-square test  $p = 0.03$  ( $p < 0.05$ ) in observing the relationship of risk factors to the incidence of helminthiasis. The results obtained  $p < 0.05$  so that there is a relationship between risk factors for helminthiasis.

Table 5.1 Relationship to worm infection with risk factors

No.	Risk Factors	The incidence of	Procentages	Sigma
		intestinal worms		
		N	%	
1	Nail Hygiene	13	61.9	
2	Hand washing habits	5	23.8	0.03
3	Using Footwear	3	14.3	
	Total	21	100	

## 5.2 Discussion

Based on the results of data analysis that has been obtained, there is a relationship between risk factors for the incidence of helminthiasis.

This study is in line with Evi, 2007 that less hygienic living habits cause the number of worm disease to occur. One of them occurs a lot in school-age children who negatively affect their growth and development. Worm disease is widespread, both in rural and urban areas.

In Rizki , Rahmad Study 2008 that the factor of helminthiasis infection was influenced by several factors, such as environmental factors (climate, temperature, sunlight, wind), individual hygiene factors (maintaining cleanliness, a regular way of life, healthy food, hand washing habits, using footwear), and environmental sanitation (environmental hygiene and environmental health).

The Nurmarani study, 2018 states that this infection can occur in tropical and subtropical regions. Nail hygiene plays a role in the occurrence of helminthiasis, hand washing habits can also be a factor in helminthiasis, based on the theory of hand washing before meals has an important role in the occurrence of worm infections, because worm eggs usually enter the body through food that has been contaminated, both from human hands from vector disease like flies. Then the worm eggs are swallowed together with these foods and develop in the human intestine.

The Muchlisah's 2014 study showed there is an association between food hygiene behavior such as hawker behavior and worm infections in elementary school children. In this study, it was shown that children who were positively infected with worms tended to buy snacks that were not closed and were in an environment that allowed transmission of worm eggs. In this study also showed that children infected with worms with snacks at random had 1.58 times greater risk of being infected with worms than children who did not have snack habits carelessly.

## CHAPTER VI

### CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 Conclusions

Based on the results of research conducted on 21 students of the Medan Tembung Muhammadiyah Elementary School in 2018 it can be summarized as follows:

1. There is a significant relationship between helminthiasis and nail hygiene, hand washing habits and the habit of using footwear.
2. From the results of the study found the frequency of age of 21 students of class I-VI Muhammadiyah Elementary School 25 Medan Tembung In 2018, 7 years old were 2 students (9.5%), 8 years old 6 students (28.6%), aged 9 years 5 students (23.8%), 10 years old 5 students (23.8%), and 12 years old 13 students (14.3%).
3. From the results of the study it was found that the frequency of students who did not maintain nail hygiene was 13 students (71.4%), who had poor hand washing habits as many as 5 students (23.8%), and those who did not use footwear as many as 3 students (14.3%). The total number of students infected with worms was 21 people.

#### 6.2 Recommendations

1. For the school to be able to enforce the discipline of students, by conducting periodic checks such as nail examinations and making messages about the dangers of helminthiasis around the school environment.
2. For the Mandala Community Health Center to continue to provide guidance to all Elementary schools in the working area of the Mandala Community Health Center to provide good cooperation and School Health Services (UKS) activities has to run well.
3. For further researchers it is recommended to conduct further research to find out the causes of intestinal infection and examine other risks that can be inflicted by other factors

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## ATTACHMENT:

## Validation Correlation

		kebiasaan mencuci tangan 1	kebiasaan mencuci tangan 2	kebiasaan mencuci tangan 3	kebiasaan mencuci tangan 4	kebiasaan mencuci tangan 5	Kebersihan kuku 1	Kebiasan Menggunakan Alas kaki	kebersihan kuku 2
Kebiasaan mencuci tangan 1	Pearson Correlation	1	.450	.502	.318	.612	.327	.402	.427
	Sig. (2-tailed)		.486	.779	.545	.060	.356	.779	.356
	N	10	10	10	10	10	10	10	10
kebiasaan mencuci tangan 2	Pearson Correlation	.350	1	.402	.327	.408	.418	.612	.327
	Sig. (2-tailed)	.486		.779	.356	.242	.545	.060	.356
	N	10	10	10	10	10	10	10	10
kebiasaan mencuci tangan 3	Pearson Correlation	.402	.402	1	.356	.450	.535	.450	.535
	Sig. (2-tailed)	.779	.779		.312	.486	.111	.486	.111
	N	10	10	10	10	10	10	10	10
Kebiasaan mencuci tangan 4	Pearson Correlation	.218	.327	.356	1	.356	.429	.535	.448
	Sig. (2-tailed)	.545	.356	.312		.312	.217	.111	.896
	N	10	10	10	10	10	10	10	10
kebiasaan mencuci tangan 5	Pearson Correlation	.612	.408	.350	.356	1	.535	.467	.356
	Sig. (2-tailed)	.060	.242	.486	.312		.111	.645	.312
	N	10	10	10	10	10	10	10	10
Kebersihan kuku 1	Pearson Correlation	.327	.318	.535	.429	.535	1	.389	.448
	Sig. (2-tailed)	.356	.545	.111	.217	.111		.807	.896
	N	10	10	10	10	10	10	10	10
Kebiasan Menggunakan Alas kaki	Pearson Correlation	.402	.612	.550	.535	.567	.489	1	.789
	Sig. (2-tailed)	.779	.060	.486	.111	.645	.807		.807
	N	10	10	10	10	10	10	10	10
kebersihan kuku 2	Pearson Correlation	-.327	.327	.435	.048	.456	.548	.489	1
	Sig. (2-tailed)	.356	.356	.111	.896	.312	.896	.807	
	N	10	10	10	10	10	10	10	10

## Univariat

## Statistics

		Age	Gender
N	Valid	21	21
	Missing	0	0

24  
Age

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 7.00	2	9.5	9.5	9.5
8.00	6	28.6	28.6	38.1
9.00	5	23.8	23.8	61.9
10.00	5	23.8	23.8	85.7
12.00	3	14.3	14.3	100.0
Total	21	100.0	100.0	

## Gender

	12 Frequency	Percent	Valid Percent	Cumulative Percent
Valid Boy	15	71.4	71.4	71.4
Girl	6	28.6	28.6	100.0
Total	21	100.0	100.0	

## Risk Factor

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Nail Cleanness	13	61.9	61.9	61.9
Hand Washing habits	5	23.8	23.8	85.7
Using Foot's wear	3	14.3	14.3	100.0
Total	21	100.0	100.0	

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## Crosstabs

12  
Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Risk factor * Helminthiasis	21	100.0%	0	0.0%	21	100.0%

## Risk factor \* Helminthiasis Crosstabulation

			Helminthiasis	
			Yes	Total
Risk Factor	Nail Cleanness	Count	13	13
		% within Risk factor	100.0%	100.0%
	Washing Hand Habits	Count	5	5

	% within Risk Factor	100.0%	100.0%
Using Foot Wear	Count	3	3
	% within Risk Factor	100.0%	100.0%
Total	Count	21	21
	% within Risk Factor	100.0%	100.0%

#### Chi-Square Tests

	Value
Pearson Chi-Square	.03
N of Valid Cases	21



# Worms Infection Related to various factors among Elementary School Muhammadiyah 25 Students in Medan, Indonesia

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