INFEKSI CACING NEMATODA USUS PADA ANAK SEKOLAH DASAR KELAS 1 DAN 2 YAYASAN RAUDATHUL JANNAH SD SWASTA PENRAUJAN KECAMATAN SUNGGAL KABUPATEN DELI SERDANG

SKRIPSI

Diajukan Sebagai Salah Satu Syarat Untuk Memperoleh
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ABSTRACT

Worm disease still a health problem in Indonesia. Based on initial survey conducted at the Penraujan Primary School of the Raudatul Jannah foundation, district of Sunggal Deli Serdang, children were found to have low standard hygiene behavior which were in a high risk of worm infection. The study was aimed to observe the percentase and types of worms infected the grade 1 and 2 students of the Penraujan Primery School of the Raudatul Jannah foundation. The rescareh was carried out by using direct smear feses examination. The result shoved that 3 of 48 samples were infected by *Ascaris lumbricoides*and *Trichuris trichiura.* 1 of 3 infectied samples got double infection of *Ascaris lumbricoides*and *Trichuris trichiura.* While the rest 2 samples each of which got single infection of *Ascaris lumbricoides*and *Trichuris trichiura.*

Keyword: Intestinal Nematode Infection, Worm Infection, Elementary School Students In Grades 1 And 2

ABSTRAK

CHAPTER I

INTRODUCTION

1.1 Background of Study

Worm disease is still one of the health problems in Indonesia. Data from the World Health Organization (WHO) in 2017 stated that more than 1.5 billion people or 24% of the world's population were infected by soil-borne worms. The greatest incidence is in Sub-Saharan Africa, America, China and East Asia. In Indonesia, the prevalence of intestinal worms is still very high, namely 45-65%. In certain areas with poor sanitation, high heat and humidity, the prevalence of helminth infections can reach 80% (Seufianti, 2016).

In North Sumatra, especially in Medan, the prevalence of intestinal worms in children is around (60-75%) of all cases. Inadequate environmental sanitation conditions, community characteristics, as well as low socioeconomic conditions supported by a climate suitable for the growth and development of worms are some of the factors that cause the high prevalence of intestinal nematode worm infections transmitted in North Sumatra (Daulay, 2016).

According to the results of national worm survey in 2019 by the Directorate General of P2PL, 31.8% of elementary school students suffer from intestinal worms. Based on a 2018 survey by the Ministry of Health of the Republic of Indonesia, the prevalence of intestinal worms in elementary school children in Indonesia is between 60–90%.

Humans are one of the hosts for several intestinal nematodes. Intestinal nematodes are nematodes that live in the digestive tract of humans and animals. Intestinal nematodes that are transmitted through the soil are called Soil Transmitted Helminths

(STH). Soil Transmitted Helminth (STH) infection can be transmitted through human feces containing worm eggs or contaminated with worm eggs which can be a source of infection. Adult worms that live in the intestines produce thousands of worm eggs every day (Ali, 2017).

In an environment with poor sanitation, these worm eggs will contaminate the soil in various ways. Worm eggs can stick to vegetables and fruits that are not cleaned properly, or are not peeled and not cooked properly which are swallowed directly into the mouth. The eggs of these worms can also be ingested from contaminated water sources, and can also be swallowed by children who play with contaminated soil and eat without washing their hands first. Transmission of worm eggs can also penetrate the skin of the feet in people who walk barefoot on contaminated soil and the use of feces as plant fertilizer is a risk factor for intestinal worm infection (Faridan, 2015).

Worms often occur in children and toddlers in the lower middle class community. Children often suffer from worms due to lack of personal hygiene, not washing hands before eating, poor environmental sanitation, defecating in any place, playing barefoot, poor health and nutritional status, low socioeconomic conditions, often playing on the ground and in a dirty environment. Elementary school age children (ES) are more often attacked by worm infections because their activities are more related to the soil, do not maintain personal hygiene and do not pay attention to the cleanliness of the food or drinks they consume. Children who live in a clean environment and are not likely to be infected with Soil Transmitted Helminth (STH) worm eggs can also be infected from their play area where the environment is polluted by feces containing worm eggs (Chadijah 2017).

From observations made by the researcher at the Raudatul Jannah Foundation, Penraujan Private Elementary School, Sunggal District, Deli Serdang Regency, which previously had never conducted research on intestinal worms in elementary school

students, it was still found that children did not pay attention to personal hygiene such as playing in school gutters, on the ground, playing dirty and some children do not use footwear, long nails and the habit of not washing their hands with soap before and after playing, thereby increasing the risk of intestinal worms in children. There were some students who immediately bought snacks and ate them immediately without washing their hands or clean his hands first. Previously, the researcher had planned a research at SD Negeri 060834 in Sei Putih Barat Village, Medan Petisah Sub-district, but due to the Covid-19 pandemic, the school did not accept any research to conduct at the school, so the researcher and supervisors decided to change the research location at Raudatul Jannah Foundation, Penraujan Private Elementary School, Sunggal District, Deli Serdang Regency.

Based on interviews with 4 teachers for grade 1 and 2, they said that not all students were able to live a clean and healthy life, which was marked by children playing in the school yard by opening their shoes and some children with long nails eating snacks without washing their hands with soap first and threw garbage in the wrong place.

Based on the conditions above, the researcher is interested in conducting a research on intestinal nematode worm infection in elementary school students at grade 1 and 2 of Raudatul Jannah Foundation, Penraujan Private Elementary School, Sunggal District, Deli Serdang Regency.

1.2 The Formulation of Problems

Based on the background above, the problem in this research is whether there is infection of intestinal nematode worm eggs in elementary school students at grade 1 and 2 of Raudathul Jannah Foundation, Penraujan Private Elementary School, Sunggal District, Deli Serdang Regency.

1.3. The Aim of Study

The purpose of this study is to determine the percentage and types of intestinal nematode worm eggs that infect elementary school students at grade 1 and 2 of Raudathul Jannah Foundation, Penraujan Private Elementary School, Sunggal District, Deli Serdang Regency.

1.4. The Significance of Study

The significance of this research can enrich knowledge and serve as information material that can be used in further research. It is also a valuable experience, additional insight for researchers in conducting scientific research where researchers can apply and utilize the knowledge gained during education, as well as increase researchers' knowledge about intestinal nematode infections.

CHAPTER II

LITERATURE REVIEW

2.1 Intestinal Nematodes

Intestinal nematodes are nematodes that live in the digestive tract of humans and animals. Humans are hosts for several intestinal nematodes, most of which are the cause of public health in Indonesia. Supporting factors include natural conditions, climate, socio-economics, education, population density and there are still many who do not maintain personal hygiene and the surrounding environment (Safar, 2016).

Among the intestinal nematodes there are several types of species that are transmitted through the soil called Soil Transmitted Helminth (STH). Trichostrongylus species. Other important intestinal nematodes also present in humans and classified as Non-Soil Transmitted Helminth (STH) are Oxyuris vermicularis and Trichinella spiralis. A female worm can release as many as 20 to 200,000 eggs or larvae a day. These eggs or larvae are excreted from the human body with feces. Larvae usually grow by molting. Infective forms can enter the human body in various ways, namely some are actively entered, some are ingested or entered by vectors through bites (Soedarto, 2017).

Symptoms that arise in patients can be caused by adult worms and larvae. Sometimes patients experience symptoms of mild intestinal disorders such as nausea, decreased appetite, diarrhea or constipation. In severe infections, especially in children, malabsorption can occur so that it worsens the malnutrition situation. Effects Serious problems occur when these worms clump together in the intestines, causing intestinal obstruction (ileus) (Sutanto, 2015).

2.1.1 The Category of Soil Transmitted Helminths (STH)

1. 1. Ascaris lumbricoides (roundworm)

Roundworms are included in the class of intestinal nematodes which are widely found in tropical and subtropical areas whose regional conditions show poor hygiene and environmental conditions. A parasitic disease caused by infection with Ascaris lumbricoides, a type of intestinal nematode worm belonging to the Ascaroidea superfamily, genus Ascaris. Ascaris lumbricoides belongs to the group of soil-transmitted helminths (Soil Transmitted Helminths), which is found cosmopolitanly with the highest prevalence in hot and humid climates, where hygiene and environmental hygiene conditions are inadequate. These worms are also found in areas where human feces are used as fertilizer (Irianto, 2016).

a. Classification

Toxonomy Ascaris lumbricoides is:

Latin name: Ascaris lumbricoides

Phylum: Nemathelminthes

Sub phylum: Ascaridoidae

Order: Rhabdidata

Family: Ascarididae

Genus: Ascaris

Species: Ascaris lumbricoides

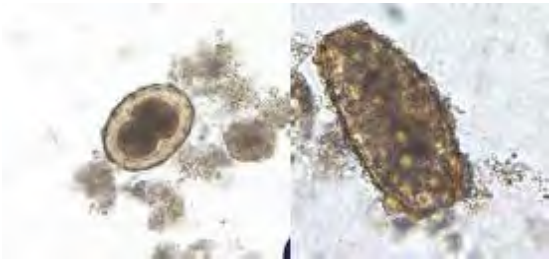
b. Deployment

These worms are found cosmopolitan (all over the world), especially in the tropics and are closely related to hygiene and sanitation. More often found in children. In Indonesia, the frequency is high ranging from 20-90% (Safar, 2016).

c. Morphology

Adult worms live in the human small intestine. The length of the female worm is 20-40 cm and the male worm is 15-31 cm. Female worms can lay up to 200,000 eggs a day, which can last for a lifetime of about 1 year. These eggs do not hatch in the human body, but are excreted in the feces of the host. The eggs of these worms are fertilized, called Fertilized. There are two kinds of this form, namely that which has a cortex called Fertilized-corticated. The size of this egg is 60 x 45 microns. Eggs that are not fertilized are called unfertilized, they are more than 90 x 40 microns in size and do not contain an embryo inside. Eggs that are fertilized when passed in human feces are not infective. On the ground at a temperature of 20°C-30°C, within 2-3 weeks it becomes mature which is called an infective egg and in this egg there are already larvae. These infective eggs can live a long time and are resistant to bad influences (Safar, 2016).

Gambar 1. Adult worm of *Ascaris lumbricoides* (Margono, 2015)



Gambar 2. Egg worm of Ascaris lumbricoides fertilized and unfertilized (Margono, 2015)

d. Life cycle

Worm eggs come out with the patient's feces. In suitable soil the eggs develop into infective eggs containing worm larvae. If the infective eggs are ingested, in the intestines the eggs hatch. The larvae emerge from the eggs, penetrate the intestinal wall, enter the hepatic portal vein. Then with the flow of blood into the heart, into the lungs, through the walls of the capillaries into the alveoli. From the alveoli, the larvae crawl to the bronchi, trachea, and larynx, then to the pharynx, esophagus, stomach and to the small intestine. After molting, the larvae develop into adult worms. Circulation of worm larvae along with the bloodstream entering the organs of the heart, lungs, to the intestines is called "lung migration". Two months after the occurrence of infection, namely the entry of infective eggs into the mouth, an adult female worm begins to be able to lay eggs which in one day can lay as many as 200,000 eggs (Soedarto, 2017).

e. Pathology and Clinical Symptoms

Ascaris lumbricoides infection will cause ascariasis. This disease causes symptoms caused by the larval stage and the adult stage.

1) Larval stage, which is damage to the lungs that causes symptoms called Loffler's syndrome which consists of coughing, increased eosinophils in the blood, and a chest X-ray shows a fine white shadow that is evenly distributed throughout the lung fields which will disappear in time. 2 weeks. Symptoms can be mild and can be severe in susceptible patients or severe infections (Safar, 2016).

2) Adult stage, mild intestinal symptoms usually occur. In severe infections, especially in children, malabsorption can occur which exacerbates malnutrition due to deprivation

of food by adult worms. When adult worms accumulate, it can cause obstructive ileus (Safar, 2016).

f. Laboratory Diagnostics

The way to make a diagnosis of the disease is by direct examination of the stool. The presence of eggs in the stool confirms the diagnosis of acariasis. In addition, a diagnosis can be made when the adult worms exit themselves either through the mouth or nose due to vomiting or through feces (Sutanto, 2015).

g. Prevention

Prevention of ascariasis is shown to break one of the chains of the life cycle of Ascaris lumbricoides, among others, by examining worm eggs and treating ascariasis sufferers, intended to eliminate the source of infection. Health education, especially regarding food hygiene and disposal of human feces, it is recommended not to defecate in any place and wash hands before eating, cook food well, wash vegetables and fruits properly (Widodo, 2015).

2. Trichuris trichiura (whip worm)

Tricuriasis is an infection caused by Trichuris trichiura. This disease mainly occurs in subtropical and tropical areas, with poor environmental hygiene and a warm and humid climate that allows the eggs of this parasite to incubate in the soil (Widodo, 2015).

a. Classification

Toxonomy Trichuris trichiura are:

Class : Nematodes

Subclass : Aphasmidia

Order: Enoplid

Superfamily: Trichuroidea

Genus: Trichuris

Species: Trichuris trichiura

b. Deployment

The spread of this disease through soil contamination with feces. Worm eggs grow in clay, moist and shady soil with an optimal temperature of 30oC. The use of feces as garden fertilizer is a source of infection. In some rural areas in Indonesia the frequency ranges from 30-90% (Safar, 2016).

c. Morphology

This whip-shaped worm, the male worm is about 4 cm long and the female worm is 5 cm long. The tail of the male worm is curved ventrally, while the female worm has a rounded/blunt shape like a comma. Size 50 x 22 microns. Worm eggs are distinctive in shape, similar to melon seeds, brown in color. Worm eggs are brown, have two prominent clear poles (Soedarto, 2017).

Figure 3. Egg worm of *Trichuris trichiura* (Margono, 2015)

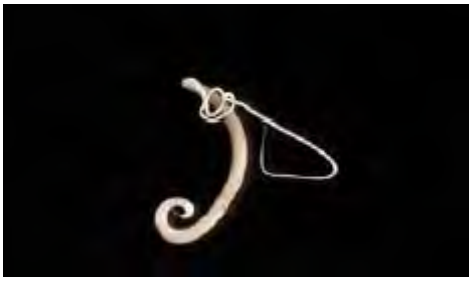


Figure 4. Adult worm of *Trichuris trichiura* (Margono, 2015)

d. Life cycle

Eggs that come out with feces in an immature state (not yet splitting) are not infective. Such eggs need to ripen in the soil for 3-5 weeks until an infective egg is formed which contains an embryo inside. Thus, these worms belong to the "Soil Transsmitted Helminths" where the soil functions in egg maturation. Humans get the infection if the eggs are infective ingestion. In the proximal part of the small intestine, the eggs hatch, the larvae come out, and they stay for 3-10 days. After adulthood, the worms will descend into the large intestine and settle in a few years. It is clear that the larvae do not migrate in the circulating blood to the lungs. The time it takes from infective eggs to be ingested until the female worm produces eggs is 30-90 days (Widodo, 2015).

e. Pathology and Clinical Symptoms

Trichuris worms in humans mainly live in the cecum, but can also be found in the ascending colon. In severe infections, especially in children, the worms are spread throughout the colon and rectum. Sometimes seen in the rectal mucosa which has prolapsed due to straining of the patient during defecation. This worm inserts its head into the intestinal mucosa, causing trauma that causes irritation and inflammation of the intestinal mucosa. There may be bleeding at the site of attachment. In addition, this worm also sucks the blood of its host, so it can cause anemia. Patients, especially children with

severe and chronic trichuris infection, show symptoms of diarrhea which are often interspersed with dysentery syndrome, anemia, weight loss and sometimes rectal prolapse (Sutanto, 2015).

f. Laboratory Diagnostics

Microscopic examination of the stool to find worm eggs that are characteristically shaped. Rectoscopy can show the presence of adult worms attached to the intestinal mucosa. Blood examination shows a picture of eosinophilia (Soedarto, 2017).

g. Prevention

Prevention is done by maintaining hygiene and sanitation, throwing feces in place, washing hands before eating, washing vegetables or cooking them before eating and conducting socialization to the community, especially children about sanitation and hygiene (Widodo, 2015).

3. Hookworm

The most important hookworm species in humans are Necator americanus and Ancylostoma duodenale. Hookworms are given the name "hookworms" because in ancient times these worms were found in Europe in mining workers who did not have adequate sanitation facilities. The infection is most often found in warm and humid areas with poor hygiene. Ancylostoma duodenale is found in the Mediterranean region, India, China, and Japan. Necator americanus is found in tropical Africa, Asia and America (Widodo, 2015).

a. Classification

Toxonomi Necator americanus and Ancylostoma duodenale are:

Phylum: Nemathelminthes

Class : Nematodes

Subclass : Phasmida

Order: Rhabditida

Family: Ancylostomatidae

Genus: Ancylostoma and Necator

Species: Ancylostoma duodenale and Necator americanus

b. Deployment

Necator americanus and Ancylostoma duodenale are the most important hookworms among the worms that infect humans. Hookworm infection is one of the most important helminth infections in humans and its distribution is very wide, especially in tropical and subtropical areas of Asia, including Indonesia. In Indonesia, the most commonly found is infection by Necator americanus (Andi, 2015). Getting used to wearing footwear such as sandals or shoes, especially when working in the garden or in the mines is the right step to prevent intestinal worms (Sutanto et al, 2015).

c. Morphology

Ancylostoma duodenale is larger than Necator americanus, the female is 10-13 mm x 0.6 mm, the male is 8-11 x 0.5 mm, shaped like the letter C, Necator americanus is S-shaped, the female is 9-11 x 0.4 mm and the male 7-9 x 0.3 mm. The oral cavity of Ancylostoma duodenale has two pairs of teeth, Necator americanus has a pair of chitin objects. The male genitalia is single, known as the bursa copalatrix.

Figure 5. Adult worm of *Ancylostoma duodenale* (Margono, 2015)

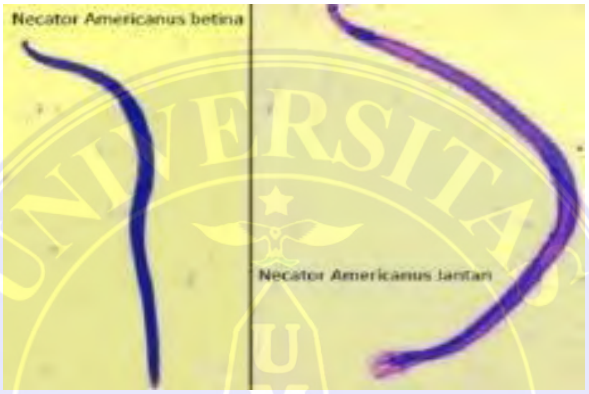


Figure 6. Adult worm of *Necator americanus* (Margono, 2015)

The eggs of these two species are indistinguishable, their size is 40-60 microns, oval shape with thin walls and clear. Ovum from newly released eggs are not segmented female Ascaris duodenale in one day laying eggs 10,000 grains, while Necator americanus 9,000 grains (Safar, 2016).

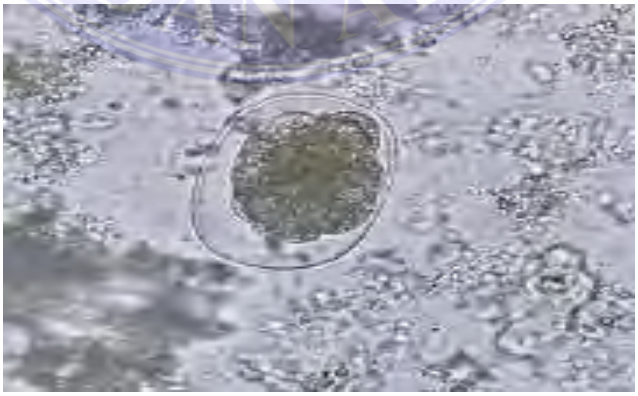


Figure 6. Egg worm of *Hookworm* (Margono, 2015)

d. Life cycle

In the life cycle of hookworms, "lung migration" also occurs, namely the circulation of hookworm larvae in the blood to the heart and lungs. Eggs that come out with feces in the soil within two days will hatch into rabditiform larvae that are not infective. After molting twice, rabditiform larvae within 1 week develop into infective filariform larvae. These larvae are able to penetrate the patient's skin, enter the bloodstream capillary, then to the heart, lungs, bronchi, trachea, esophagus, stomach and finally matures in the small intestine. Within one month, female worms are able to lay eggs (Soedarto, 2017). Ancylostoma duodenal worm egg infection occurs when filariform larvae penetrate the skin and if possible accidentally ingest filariform larvae (Safar, 2016).

e. Pathology and Clinical Symptoms

1) Larval stage: when many filariform larvae penetrate the skin at once, there is a change in the skin called groind itch. Changes in the lungs are usually mild. Oral infection with Ancylostoma duodenale filariform larvae causes Wakana disease with symptoms of nausea, vomiting, pharyngeal irritation, cough, neck pain, and hoarseness (Sutanto, 2015).

2) Adult stage: symptoms depend on the species and number of worms and the nutritional status of the patient (fe and protein). Each worm Necator americanus causes blood loss of 0.005 – 0.1 cc a day, while Ancylostoma duodenale 0.08 – 0.34 cc. In chronic infections or severe infections, hypochromic microcytic anemia occurs. In addition, there is also eosinophilia. Hookworms usually do not cause death, but resistance decreases and work performance decreases (Sutanto, 2015).

f. Laboratory Diagnostics

Diagnosis is made by finding eggs on direct stool examination (direct smear). Morphologically, the eggs of Necator americanus and Ancylostoma duodenale cannot be distinguished. If the number of hookworm eggs is small, the stool sample is concentrated by using formol ether technique or flotation using saturated salt or saturated ZnSO4. To distinguish the two species, filariform larvae were identified from fecal cultures.

g. Prevention

Avoid open defecation and avoid feces as fertilizer. Keep the environment clean and personal hygiene through education or school-based counseling involving students, teachers and parents. Mining and plantation workers need to be given education on the use of footwear (shoes) and gloves to avoid hookworm infection (Sutanto et al. , 2015).

4. Strongyloides stercoralis (thread worm)

The cause of Strongyloides disease is Strongyloides stercoralis. These worms are transmitted through the soil (Soil Transmitted Helminths) but these worms can live and reproduce in the body of the host for several years, because they are capable of causing autoinfection (Soedarto, 2015).

a. Classification

Toxonomy Strongyloides stercoralis are:

Kingdom : Animalia

Phylum: Nematoda

Class : Secernentea

Order: Rhabditida

Family: Strongyloididae

Genus: Strongyloides

Species: Strongyloides stercoralis

b. Deployment

The spread, especially in the tropics and subtropics, is rarely found in areas with moderate temperatures or areas with cold climates. The prevention to prevent intestinal worms is to not eat raw or undercooked vegetables (Safar, 2016).

c. Morphology

These nematodes are smooth like threads without an oral cavity, 5-10 mm in size, eggs resemble hookworm eggs, do not have a pulmonary cycle. Infection occurs by ingestion of larvae (Safar, 2016).

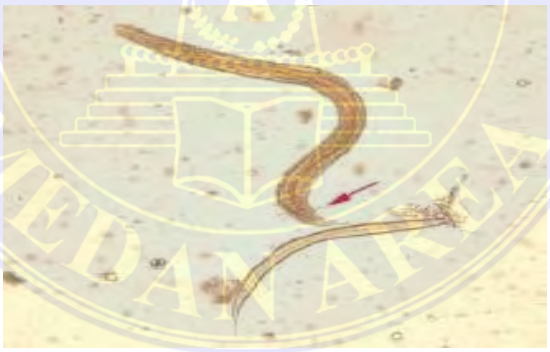


Figure 8. Strongyloides stercoralis adult male worm (Margono, 2015)

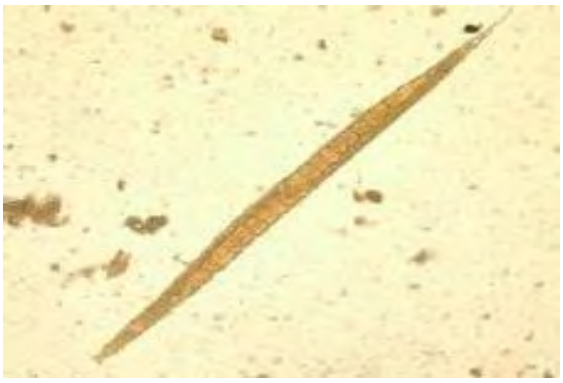


Figure 9. Strongyloides stercoralis adult female worm (Margono, 2015)

d. Life cycle

1) Live cycle

Within 2-3 days in the soil the rhabditiform larvae change their skin into long, slender and infectious filariform larvae. These filariform larvae penetrate the human skin and then enter the venous circulation through the right heart to the lungs up to the glottis, ingested, to the small intestine and become adults. During migration within the host's body, the larvae undergo 2 changes of skin to become young adults. Adult female worms lay eggs 28 days after infection.

2) Indirect cycle

Rhabditiform larvae in the soil transform into free-form male and female worms. After fertilization the female worm produces eggs which hatch into rabditiform larvae. These larvae can become infectious filariform larvae within a few days and enter a new host or the rhabditiform larvae repeat the free-living phase (Oktapyani, 2016).

3) Autoinfection

Ditiform larvae sometimes become filariform larvae in the intestine or in the area around the anus (perianal). When filariform larvae penetrate the intestinal mucosa or perianal skin, a developmental cycle occurs in the host. endemic.

e. Pathology and clinical symptoms

If many filariform larvae penetrate the skin, a skin disorder called creeping eruption occurs and is accompanied by itching. Mild infection is usually asymptomatic, moderate infection can cause nausea, vomiting and a stabbing pain in the middle epigastric area and does not spread while in Severe infections can cause inflammation where the worms are attached and can cause abdominal pain, diarrhea, constipation and

anemia and can also cause death. Prevention is by not eating raw or undercooked vegetables (Safar, 2016).

f. Laboratory Diagnostics

The diagnosis can be made by finding rhabditiform larvae in fresh stool, stool culture and duodenal aspiration. However, because the infection is generally mild, direct stool examination is often difficult to find a diagnostic form. Indirect stool examination is therefore necessary using the stool culture technique. The diagnostic form found from the buffered faecal culture is in the form of free-living adult worms, filaform larvae, and rhabditiform larvae (Safar, 2016).

g. Prevention

Efforts to prevent the occurrence of Strongyloides stercoralis infection, although basically not much different from prevention efforts against Hookworm, are more difficult because in Strongyloides stercoralis there are several types of animals that can act as intermediate hosts (Prasetyo, 2016).

2.1.2 The Category of Non Soil Transmitted Helminth (STH)

1. 1. Oxyuris vermircularis (pinworms)

It is a parasitic infection that usually attacks children, where these worms grow and multiply in the intestines. Oxyuris vermircularis can cause enterobiasis and oxyuriasis. This worm disease usually hits people who have difficulty getting food, sometimes they can only scavenge garbage on the streets and swallow stale food leftovers in a crowd of flies (Safar, 2016).

a. Classification

The toxonomies of Oxyuris vermircularis (pinworms) are:

Phylum: Nematoda

Subclass: Plasmidia

Order: Rhabditia

Genus: Enterobius

Species: Enterobius vermicularis or Oxyuris vermicularis

b. Deployment

These worms are found throughout the world, but are most prevalent in temperate and tropical climates. The spread of Oxyuris vermicularis worms can occur through direct contact with contaminated people or objects. These worm eggs usually enter the human body through the mouth (Irianto, 2016).

c. Morphology

Oxyuris vermicularis is asymmetrical, colorless, has a thin egg wall and is translucent. Eggs are 50-60 microns in size. The size of male worms is 2-5 mm x 0.1-0.3 mm, female worms are 8-13 mm x 0.3-0.5 mm (Soedarto, 2017).

Figure 10. Egg worm of *Oxyuris vermicularis* (Margono, 2015)

Figure 11. *Oxyurisvermicularis* adult male worm (Margono, 2015)

Figure 12. *Oxyurisvermicularis* adult female worm (Margono, 2015)

d. Life cycle

Adult worms are found in the cecum, appendix and parts adjacent to the ileum and ascending colon. This worm attaches itself to its head on the mucosa. The lifespan is short, namely a maximum of two and a half months. Female worms that contain eggs are carried passively, out and lay eggs in the perianal area. After laying eggs, the female worm dies. The number of eggs of a female worm is approx 11,000 items. The eggs that come out already contain larvae (infective) (Intan, 2017).

When the female worm crawls and lays eggs in the perianal, it causes itching, and when scratched the eggs containing the larvae will stick to the nails and if eaten will cause new infections. This mode of transmission is called autoinfection. In addition, hands containing eggs can also be transmitted to others through food and drink (Irianto, 2016).

The life cycle of this worm's egg starts from ingestion of a mature egg until it becomes a gravid adult worm that migrates to the perianal area and lasts approximately 2 weeks to 2 months. It is also possible that the life cycle only lasts about 1 month because worm eggs can be found again in the anus at the earliest. 5 weeks after treatment. Pinworm infection can heal itself (self-limited) even without treatment.

e. Pathology and clinical symptoms

Itching around the anus, children become fussy (because of itching and disturbed sleep at night), sleep deprivation (itching that occurs every night when adult female worms move to the anal area and deposit eggs), decreased appetite and weight loss (Zulkoni , 2016).

f. Laboratory diagnostics

Diagnosis is made by finding the adult worms or their eggs. Worm eggs can be taken with an anal swab that is placed around the anus in the morning before defecating and washing the buttocks (Susanto, 2016). It is recommended that the examination be carried out three days in a row.

g. Prevention

By treating patients and their families or people who live in the same house, personal and environmental hygiene must be maintained (Soedarto, 2017). It is best if nails are always cut short, wash hands before eating and children with pinworms wear long pants when going to bed so that the mat mattresses are not contaminated and hands cannot scratch the perianal area. Avoid food from dust and hands that contain parasites

and clothes and mattress pads are washed and changed frequently (Tirtayanti, et al, 2016).

2. Trichinella spiralis

Trichinella spiralis is one of the nematodes/millworms. Trichinella spiralis causes diseases called trichinosis, trichinelosis, and trichiniasis. Almost all over the world there have been reports of diseases caused by Trichinella spiralis. This parasite was first discovered in human tissue during autopsies in the early 1800s, Onggowaluyo (2015) concluded that the infection was caused by eating raw sausage. Several years later, it was experimentally proven that trichinosis is definitely a known public health problem (Purba, 2015).

a. Classification

Toxonomy Trichinella spiralis are:

Phylum: Nematoda

Class: Adenophora

Order: Trichinellida

Family : Trichinellidae

Genus: Trichinella

Species: Trichinellaspiralis

b. Deployment

These worms are found throughout the world, but are most prevalent in temperate climates. Trichinella spiralis or also known as muscle worms is an animal belonging to the invertebrate members of the phylum Nematoda. This worm causes trichinosis in humans, pigs or mice. Parasites enter the human body through undercooked pork.

c. Morphology

Adult male worms measure 1.4 - 1.6 mm x 0.06 mm. While the female worms are longer, can reach 4 mm. At the posterior end of the male worm, there are 2 papillae that distinguish its shape from the female worm. Female worms do not lay eggs but give birth to larvae (viviparous), but in the host muscle, larvae are generally found in the form of cysts.

Figure 13. *Larvae of Trichinella spiralis* (Margono, 2015)

Figure 14. *Trichinella spiralis* adult male worm (Margono, 2015)

Figure 14. *Trichinella spiralis* adult female worm (Margono, 2015)

d. Life cycle

Infection in humans begins with eating pork, bear, sea lion (walrus) or other mammalian meat (carnivores and omnivores), either raw or undercooked. The flesh may contain cysts containing live infective larvae. After the cyst enters the stomach, excystation occurs and the larvae that come out and then enter the intestinal mucosa become adults. On the sixth day after infection, the female worms begin to secrete motile larvae. This larval release continues for about 4 weeks. The number of larvae produced can reach 135-1500 tails.

These larvae then move into the blood vessels, following the blood and lymph flow to the heart and lungs, finally penetrating the muscles. Muscles that are very active will be invaded, including the diaphragm, muscles of the larynx, jaw, neck and ribs, biceps, gastronemius and others.

e. Pathology and clinical symptoms

The incubation period for trichinosis is estimated to be between 10-14 days after eating infected meat and varies from 5-45 days. This variation in incubation period is

related to the number of larvae consumed, because the symptoms and signs of the disease will only become apparent when there is infection with 10 larvae per gram of meat.

Symptoms that can arise include abdominal pain, nausea, vomiting and diarrhea. Then the patient experiences severe pain in the muscles of movement, followed by respiratory problems, swallowing disorders and difficulty speaking. In addition there can be enlargement of the lymph nodes, edema around the eyes, nose and hands.

If there is necrosis of the heart muscle, myocarditis will occur which can cause death of the patient. Patients can also experience inflammation of the brain (encephalitis) and inflammation of the lining of the brain (meningitis), deafness, eye disorders, neurotoxic symptoms such as neuritis, hallucinations, delirium, disorientation or experience complications such as pneumonia, peritonitis and nephritis (Novia, 2015).

f. Laboratory diagnostics

A definite diagnosis of trichinosis can be established if adult worms or larvae of adult worms or worm larvae can be found. Adult worms or worm larvae may be found in the feces of patients when experiencing diarrhea. Serological examination was carried out using the Bentonite Flocculation Test (BFT) and ELISA technique. On haematological examination, peripheral blood eosinophilia is at least 20%. Radiological examination can also help show the presence of cysts in the patient's tissues or organs (Andi, 2016).

g. Prevention

Cook the meat perfectly because the larvae die at a temperature of 60-70°C. Store meat at -17°C for 20 days, or longer if the meat is thick >15 cm (often ineffective for wild animal meat) and Caution: Larvae do not die (survival) on smoked/salted meat.

CHAPTER III

RESEARCH METHOD

3.1 Research Location and Time

This study was conducted for 3 months, from August to October 2020. The research was conducted at Raudhatul Jannah Education Foundation, Penraujan Private Elementary School, Jl. Setia Agung Sunggal Kanan, Sunggal District, Deli Serdang Regency. The examination was done at Darussalam Health Center Laboratory, Jl. Darussalam No: 40 Medan.

3.2 Research Materials and Tools

The material used in this study was feces (stool) in elementary school students at grade 1 and 2. The reagent consisted of 0.1% Eosin solution and 0.9% NaCl solution. The tools used in this study included: PPE (personal protective equipment) such as laboratory coats, masks and gloves, stationery, microscopes, sample pots, glass objects, glass decks, dropper drops and sticks or skewers.

3.3 Research Population and Sample

The population in this study were all elementary school students in grade 1 and 2 of Raudathul Jannah Foundation, Penraujan Private Elementary School, Sunggal District, Deli Serdang Regency, amounting to 96 people. Due to limitations in conducting research due to the COVID-19 pandemic, there was a minimum number that could be taken by the researcher, namely as much as 30 samples using a sampling technique by accidental sampling, namely those that happen to exist or are available samples (Sugiyono, 2016), so that the samples used in this study were 48 samples (Appendix 1).

3.4 Research Method

The method used in this research was direct smear/direct slide examination.

3.5 Work Procedure

Stool samples (feces) were collected using sample pots that had previously been labeled or given the patient's name. Then the sample is taken directly to the laboratory for examination. Use PPE (personal protective equipment). Prepare a glass object that has been labeled or written with the patient's name and then take a sufficient sample of feces using a stick or skewer then the stool sample is placed on both sides of the glass object, discarding the rough part of the stool preparation. Then, 1 drop of 0.1% Eosin solution was dripped over the preparation on one side and 1 drop of 0.9% NaCL solution was placed on the preparation on the other side. Then a glass deck is placed on top of each of the preparations (covering the entire preparation) slowly so that it is evenly distributed, care is needed so that no air bubbles form in the preparation. Then it is examined under a microscope with 10X and 40X magnification. The stool sample contained intestinal nematode worm eggs while the results were negative if there were no intestinal nematode worm eggs (Natadisastra, 2016).

3.6 Data Analysis Technique

The data in this study resulted from a descriptive analysis of the results to obtain the percentage of the identification results of each variable studied in order to obtain the presence of intestinal nematode worm eggs found in feces of grade 1 and 2 students at Raudatul Jannah Foundation, Penraujan Private Elementary School, Sunggal District, Deli Serdang Regency. The data obtained from this study would be presented in tabular form and described in narrative form.

CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

The results of the examination of 48 samples of grade 1 and 2 students at Raudathul Jannah Foundation, Penraujan Private Elementary School, Sunggal District, Deli Serdang Regency, were found 3 samples that were positively infected with intestinal nematode worm eggs with a percentage of 6.25% and there were 2 types of worm eggs that infect, namely Ascaris lumbricoides and Trichuris trichiura. Where sample (S 12) was infected with Trichuris trichiura worm eggs, sample (S 37) was infected with Ascaris lumbricoides worm eggs and sample (S 46) was infected with both types of worm eggs, namely Ascaris lumbricoides and Trichuris trichiura.

5.2 Suggestion

The existence of children infected with nematode worm eggs at Raudathul Jannah Foundation, Penraujan Private Elementary School, Sunggal District, Deli Serdang Regency shows that there are still many children who do not understand about maintaining personal hygiene so that they need supervision and guidance from parents and teachers, and health workers should always provide health education, conduct preventive activities by improving environmental sanitation and administering deworming medicine on a regular basis.