

# Intestinal Ascariasis Presenting as Profuse Vomiting of Adult Worm of *Ascaris lumbricoides* in Two-Year-Old Girl in Ende-East Nusa Tenggara: A Neglected Tropical Disease in Rural Area

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## Abstract:

**BACKGROUND:** Ascariasis is a soil-transmitted helminth (STH) disease and is included in 20 neglected tropical diseases that caused by *Ascaris lumbricoides*. Indonesia is one of the countries with the highest prevalence of Ascariasis in the world, reaching 32%. Clinical symptoms of Ascariasis in children are initially asymptomatic. Patients begin to complain when worms increase in the digestive tract. In this article, we report about Intestinal Ascariasis Presenting Profuse Vomit Containing Adult Worms of *Ascaris lumbricoides* in a Two-Year-Old Girl in Ende, East Nusa Tenggara.

**CASE:** A 2-year-old child came with complaints of worm-contained vomiting since approximately three days ago. The patient vomited five times per day, containing more than 10 worms measuring 12 cm in each episode of vomiting, mixed with fluid and food. Vomiting is accompanied by abdominal pain in the umbilical area. On physical examination, the stomach appears slightly distended, tenderness in periumbilical area, and increased bowel sounds. The fecal smear examination revealed *Ascaris lumbricoides* eggs were found. Abdominal x-rays showed multiple worm-shaped structures in the cecum. The patient got albendazole 400 mg/day for 3 consecutive days. After treatment, she gained clinical improvement with no more worms contained vomiting.

**CONCLUSION:** As health workers, we need to increase our awareness of worm infections, especially in endemic areas. Although supporting examinations to confirm the diagnosis are still very limited in this area, early detection with clinical assessment and complete stool examination is very useful for preventing further complications. Giving albendazole 400 mg/day for 3 days gives good results in patients affected by ascariasis.

**Keywords:** Ascariasis, *Ascaris Lumbricoides*, Neglected Tropical Disease, Vomiting Adult Worm

## 1. Background

Helminthic infections, such as Ascariasis, are a global burden as one of neglected tropical diseases. One of the soil-transmitted helminths (STH), *Ascaris lumbricoides*, is the cause of ascariasis.<sup>1</sup> About one billion people worldwide are infected with *Ascaris lumbricoides*, and more than 60,000 people die from this *Ascaris* infection every year. This disease affects most tropical and subtropical countries throughout the world and is common in Sub-Saharan Africa, Latin America, China, and East Asia.<sup>2,3</sup> Studies from 2010-2022 estimate the global prevalence of Ascariasis at 11.01%. Prevalence estimates are higher in children, and people living in rural areas

or in countries with lower income and human development index. The trend towards higher prevalence occurs in areas with increasing average annual relative humidity, rainfall, and environmental temperature.<sup>4</sup>

The percentage of worm incidence in Indonesia is generally between 2.5% - 62% in underprivileged populations who have poor sanitation.<sup>5</sup> Indonesia is one of the countries with the highest prevalence of Ascariasis in the world, reaching 32.02%.<sup>4</sup> The prevalence of worm infections, especially ascariasis, in East Nusa Tenggara is still not known for certain. One study in Oemasi, Kupang revealed that Ascariasis diagnosed using fecal samples from children aged 6 – 12 years occurred in 6.25% of the population while in Manusak Village, Kupang, the prevalence of Ascariasis reached 38.4 %.<sup>6,7</sup>

Clinical symptoms of ascariasis in children are initially asymptomatic. Patients begin to complain when worms increase in the digestive tract. Symptoms can include projectile vomiting, distension, abdominal pain, decreased appetite, bloody stools, and symptoms of gastrointestinal obstruction.<sup>1</sup> Complications that frequently arise in Ascariasis patients include pneumonitis, hepatobiliary and pancreatic damage, growth retardation, intestinal obstruction, and even peritonitis. As health workers, we are all required to be more aware of cases of worm infections, especially those in endemic areas. Early detection in patients is very useful to prevent serious and deadly complications.<sup>8</sup>

In this article, we report about Intestinal Ascariasis Presenting Profuse Vomiting Contained Adult Worm of *Ascaris lumbricoides* in Two Year Old in Ende, East Nusa Tenggara.

## 2. Case Presentation

A 2-year-old child, weight 11 kg, height 88 cm, came with complaints of vomiting worms since approximately three days ago. The day before coming to the hospital, the patient vomited five times, containing more than ten life adult worms approximately measured about 12 cm, mixed with fluid and food. Complaints accompanied by abdominal pain. Abdominal pain is felt in the umbilical area. Abdominal pain seems to come and go. there were no complaints about defecation or urination. The last defecation was in the morning before going to the hospital, the consistency was normal, and there was no blood and mucus, in the feces there were five worms measuring approximately 10 cm, some of the worms were still alive and some were dead. The patient appears fussy and has a reduced appetite.



**Fig 1. Ascariasis lumbricoides**

According to the patient's parents, approximately three weeks before admitted to the hospital, the patient had experienced the vomited with alive worms contain, and expulsion of adult worm through anal canal. The patient had never been hospitalized before. The patient and family denied any infection or recurrent bleeding. There are no complaints of similar diseases in the family or a history of hereditary diseases in the family, but about a month ago a neighbor's child complained of the same complaint, namely that there were worms in the feces. The patient's basic immunization history is complete. There was no weight loss in the patient. His family lives in a coastal area about 20 km from Ende. The patient is usually barefoot during her daily activities. The

patient does not have the habit of washing her hands. Her parents work as a fisher and farmers, with the last education were junior high school. The patient got anti-helminthic medicine three months ago before being admitted to the hospital.

On physical examination, the patient's nail tips appeared black. The abdominal examination showed slightly distended and increased bowel sounds. Laboratory and blood chemistry examination was normal. The fecal smear examination revealed *Ascaris lumbricoides* eggs. The chest x-ray showed normal result. The plain abdominal x-rays showed multiple worm-shaped structures in the caecum.

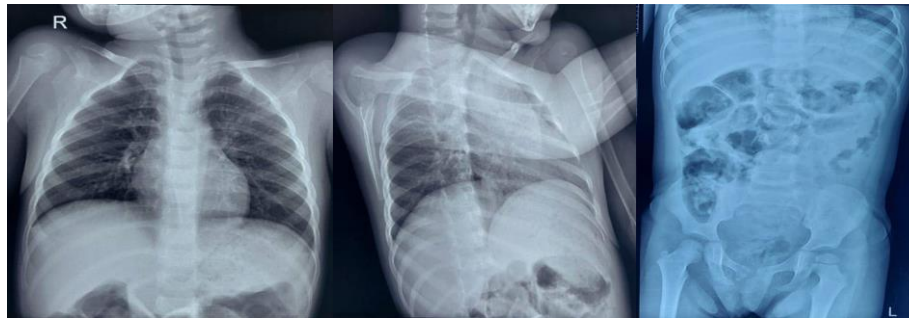


Fig 2. X-ray Thorax and Abdomen

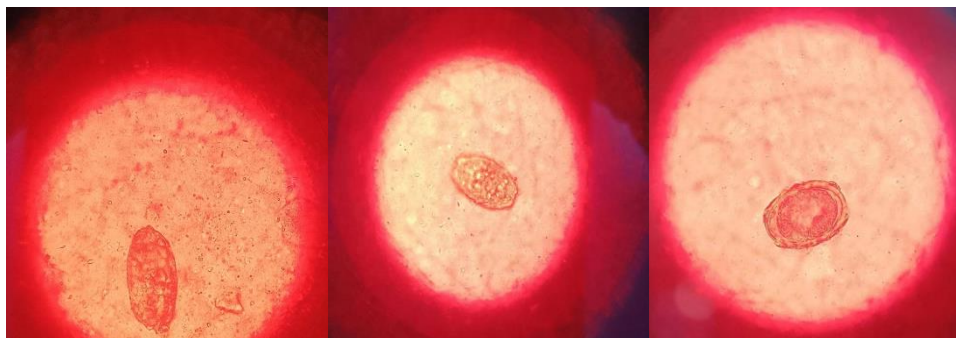


Fig 3. Fecal Smear

The patient got albendazole 400 mg/day for three consecutive days during the hospitalization. On the first day of admission, the patient vomited of adult worm of *Ascaris lumbricoides* about three times in the ward. There were seven alive adult worms of *Ascaris lumbricoides*, four worms were alive, and three others were dead. She still suffered from bloating sensation, abdominal pain, general weakness, and loss of appetite. After administering albendazole for three consecutive days, there were clinical improvements, such as no bloating sensation, no abdominal pain, and increased appetite. Based on the fecal smear evaluation there were no *Ascaris lumbricoides* eggs. The patient was discharged from hospital with stable condition.

### 3. Discussion

Ascariasis is a soil-transmitted helminth (STH) disease and included as one of 20 neglected tropical diseases. The parasite that causes ascariasis is *Ascaris lumbricoides* (*A. lumbricoides*) or commonly called roundworms. *Ascaris lumbricoides* is the largest nematode that can infect humans, its size can reach up to 35 cm.<sup>1,9</sup> The global prevalence of ascariasis is 11.01%, with the incidence most often occurring in children and people living in rural areas with climates subtropical or humid, or in developing countries. Indonesia is one of the countries with the highest incidence of ascariasis in the world, reaching 32.02%.<sup>4</sup> Massive ascariasis is a term used for recurrent *Ascaris lumbricoides* infections which cause worms to reproduce in the body in very large numbers. This occurs most often in preschool and school age children.<sup>10</sup>

In the case of the patient living in the Tanjung area. Tanjung is a coastal area located in South Ende District, Ende Regency, East Nusa Tenggara. Children who live in the area always play on the beach with barefoot. The habit of defecating not in a latrine also still occurs in this area, and patients do not have the habit of hands washing, which allows worm infections to occur. The patient's parents also said that a month ago, a neighbor's child also experienced the same complaint, namely worms coming out of his buttocks. This is also in accordance with research conducted by a study in South Kalimantan which found that the presence of ascariasis was widespread in forest, wetland, urban and coastal ecosystems. Contamination of coastal areas can occur due to the behavior of the surrounding community. The behavior of defecating not in a latrine can cause the feces to be carried by water currents to the beach and merge with the sand, thereby allowing direct contact with contaminated feces in coastal populations.<sup>11</sup>

The life cycle of the *Ascaris lumbricoides* is closely related to the clinical manifestations that arise in the patient.<sup>6</sup> Initially the infection is caused by feces produced by the previous host which contains worm eggs. The maturation time for worm eggs depends on the surrounding temperature and climate. At environmental temperature (around 30 degrees Celsius), eggs can mature within 10-55 days.<sup>12</sup> New hosts can be infected if they consume water or food that has been contaminated with embryonic egg cells. Next, the eggs develop into larvae and penetrate the intestinal wall, then migrate to the blood and lymphatic vessels. The worms then reach the lungs on the 10-14<sup>th</sup> day. The condition when larvae are in the lungs is called the acute phase. The acute phase is characterized by tissue and capillary damage as well as an immune response due to larvae. This is characterized by increased eosinophils in the lungs and capillaries. Larvae in the lungs cause pneumonia-like symptoms known as Loeffler syndrome. Furthermore, the larvae are then swallowed back into the intestines. When the larvae arrive in the intestine, they have developed into adult worms, this condition is called the chronic phase. Adult worms started laying eggs after 2 months of inoculation. When there are male and female worms in the intestines, the female worms can produce around 200,000 eggs per day. However, if there are only female worms, the female worms will still lay eggs, but the eggs produced are infertile and not contagious. If there are only male worms in the intestine, no eggs will be formed. The chronic phase is usually characterized by abdominal pain, nausea, vomiting, diarrhea and weight loss. In some cases, worms are found to pass through feces. Complications in the chronic phase usually include obstruction in the hepatobiliary, pancreas and intestines. Intestinal obstruction is the most frequent complication, with a prevalence reaching 38-87% of the total number of cases.<sup>1,13</sup> In this case it was found that the patient complained of vomiting more than 10 worms, some of the worms were found to be still alive and some were dead mixed with food. Complaints are also accompanied by abdominal pain, and worms are found in the feces. There was no icteric sclera found in the patient. There are no pale stools and tea-like urine. There are also no complaints of upper right abdominal pain. This is in accordance with the theory, patients experience symptoms in the chronic phase, but have not yet developed complications in the form of obstruction. Abdinasir also found a similar thing, in his writing he reported a case of intestinal ascariasis with symptoms of vomit containing worms, visible worms in the mouth and anus, abdominal pain and appendicitis.<sup>14</sup> Yohanis also reported a case of ascariasis with vomiting and persistent abdominal pain for 6 days to ileal perforation.<sup>15</sup>

Findings on clinical examination depend on the phase of infection. In the acute phase, sometimes there is fever in the patient, on inspection sometimes a rash appears, on auscultation there are rhonchi and wheezing in the lungs.<sup>16</sup> Meanwhile, in the chronic phase there are signs of obstruction to an acute abdomen. In patients with hepatobiliary obstruction, on inspection the sclera appears icteric, and right upper abdominal pain, sometimes liver enlargement is also found. In patients with intestinal obstruction, on inspection the stomach appears distended, with increased bowel sounds, abdominal pain, especially in the umbilical area. If the wound is not treated, complications can arise in the form of acute abdominal symptoms which can then become peritonitis.<sup>17</sup> This is in accordance with the results of the physical examination found in the case. In this case, the stomach was found to appear bulging, with increased bowel sounds on auscultation, accompanied by pain in the umbilical area. This clearly shows that the patient is in the chronic phase, leading to obstruction, this is caused by the increasing number of worms in the patient's body. However, on physical examination, no other signs of obstruction were found, such as *darm contour* and *darm steifung*. There are no muscular defansions or abdominal distension. In rectal touche, there was also no collapse of the ampulla recti, so supporting examinations in the form of imaging such as x-rays and ultrasound are needed to determine whether there is obstruction in the intestine or not.



There are several supporting examinations to confirm the diagnosis of ascariasis, including stool examination, complete blood examination, and radiological examination. Diagnosis in the early phase can be made based on clinical symptoms and laboratory results. Laboratory examination found increased peripheral eosinophilia, sputum examination also found eosinophilia and Charlot-Leyden crystals, serological examination found increased total IgG and IgE, urine examination also found metabolic products of worms, namely by detecting the presence of 2-methyl- butyramide and 2-methyl-valeramide. In the chronic phase, stool examination using the Kato Katz thick smear method is the gold standard for detecting worm eggs in ascariasis patients. However, there are several conditions where it is possible that no eggs are found in the feces, even though the clinical symptoms are very typical, for example when the infection is caused by male worms, and in the initial phase the fecal examination is not very useful, because the ovum is only produced by the female worm after 24 days. If this happens, it is best to carry out serological examination, molecular diagnostics, or imaging to confirm the diagnosis.<sup>13</sup> Imaging includes endoscopy, sonography, x-ray photos and tomography.<sup>18</sup> On ultrasound, worms can be seen as long tubes with echogenic walls in the form of a *railroad track sign*, appearance of *3-line* or *4 line* or *bull's-eye sign*.<sup>19</sup> On examination, x-ray photos are used to see whether there are signs of obstruction in the intestine as indicated by the hearing bone, air fluid lever, and stapper leader, shadow of roundworms or commonly called Whirlpool, lumps of worms in the intestine can be seen as ascariasis balls.<sup>20</sup> In this case, no increase in eosinophils was found on a complete blood test, this shows that the infection experienced by the patient was not in the initial phase. The chest x-ray results showed normal results, there were no infiltrates in the lung fields. The abdominal X-ray results showed no signs of obstruction such as air fluid level, stepped leader, and hearing bone. However, many worm-shaped structures were found in the cecum, but there were no ascariasis balls. Further examinations such as ultrasound and CT scan could not be obtained due to limited resources of our hospital.

The etiological therapy recommended by WHO is albendazole, mebendazole and ivermectin. The first choice is Albendazole 400mg single dose orally. Other options are mebendazole 100 mg twice a day for 3 days or 500 mg single dose or ivermectin 100-200 mcg per kg once.<sup>21</sup> Albendazole works on microtubular proteins in worms, interacts with tubulin, inhibits prolimation, blocks glucose uptake which causes the worms to run out of energy and die. The growth of eggs and larvae is also inhibited.<sup>21,22</sup> According to research conducted by Husin on children aged 6-12 years, a single dose of albendazole is more effective in treating *Ascariasis lumbricoides* than mebendazole. Meanwhile, both have the same effectiveness in reducing the number of eggs.<sup>22</sup> Curico conducted a study of the deworming protocol program giving albendazole 400 mg single dose to see indications of albendazole resistance and the emergence of reinfection. Even though it is significant in reducing infection and the number of *Ascariasis lumbricoides* eggs, in some cases single dose albendazole administration is inadequate, especially in multiple infections and reinfection is found 2 weeks after administration.<sup>23</sup> In Tee's study, administration of 400 mg albendazole for 3 days was proven. effectively treats *Ascaris lumbricoides* with a cure rate of 100% and an egg reduction rate above 90%.<sup>24</sup> In this case, the patient was given albendazole 400 mg orally for 3 days. This was taken into consideration because Ende is an endemic area and the patient previously had a history of vomiting worms 3 months ago after being given one-time deworming medication from a mass deworming program. The current ascariasis infection shows that giving worm medicine 3 months ago was not effective. After administering albendazole on the first day of treatment, the patient vomited 12 adult worms, some were still alive and some were dead. After the third day of treatment, the frequency of vomiting decreased and the number of worms vomited out also decreased to 1 dead worm.

In this case, it was found that the patient's nutritional status was still considered good nutrition. *Ascaris lumbricoides* is a nematode that causes intestinal infections and has a large negative impact on nutritional status. A study in Sri Lanka revealed that children infected with ascaris showed a lower average Z-score anthropometric index compared to children who were not infected. Apart from that, the study also found that infections with severe intensity were significantly associated with negative weight-for-height index z-score values.<sup>25</sup> A study in China revealed that ascariasis and malnutrition always occur together in children. Ascariasis infection in children can disrupt children's nutritional status, but the impact may be gradual depending on the role of many other factors (such as excess food supply, lack of physical activity, stress, and other environmental factors).<sup>26</sup> This factor is also possible in this case, where the patient, even though he has entered the chronic phase, still has good nutritional status. This is also supported by research in Bandung which revealed that statistically the relationship between

*Ascaris lumbricoides* infection and nutritional status and anemia status did not correlate significantly, especially in school-aged children. This research explains that infections caused by worms that are transmitted through soil will have an impact on nutritional status if the level of infection is at a moderate-to-heavy intensity level.<sup>27</sup> Similar results were also found in research conducted in North Sumatra, the population of elementary school children infected with *Ascaris* did not show any relationship to nutritional status because many factors were found that influence children's nutritional status, including eating habits, provision of food, economic status, other factors. transmission, poverty, lack of availability of environmental sanitation, and lack of knowledge about nutrition.<sup>28</sup>

#### 4. Conclusion

The clinical symptoms that arise in patients infected with worms, especially *Ascaris lumbricoides*, are initially asymptomatic, so that awareness regarding worm infections, especially in endemic areas, needs to be increased. Although supporting examinations to confirm the diagnosis are still very limited in this area, early detection with clinical assessment and complete stool examination is very useful for preventing further complications. Giving albendazole 400 mg/day for 3 days gives good results in patients affected by ascariasis.

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