

The Impact of Soil Transmitted Helminth (Sth) Towards Anemia Case in Elementary School Student in the District of Northwest Sumba

Rafael Paun¹, Wilhelmus Olin¹ & Zachry Tola¹

¹ Health Polytechnic of Health Ministry Kupang, Liliba, Kupang, Indonesia

Correspondence: Rafael Paun, Health Polytechnic of Health Ministry Kupang, Piet A. Tallo Street, Liliba – Kupang, Indonesia. Tel: 62-380-880-0256. E-mail: rafpun012@gmail.com

Received: December 7, 2018 Accepted: March 18, 2019 Online Published: April 15, 2019

doi:10.5539/gjhs.v11n5p117

URL: <https://doi.org/10.5539/gjhs.v11n5p117>

Abstract

Background: Anemia is a condition where body is having less eritrosit. Worms is an infectious sickness caused by worms' parasite that endanger health. Worms sickness that usually infects and gives very bad affect is worms infection transmitted through soil or usually called "Soil Transmited *Helmintes* (STH)." In directly STH could affects supply and absorption and food metabolism to human body. Cumulatively, STH caused disadvantages like decreasing in kalori and protein and loss of blood. This research aims to analysis impact factors of *The Infection of Soil Transmitted Helminth (STH)* towards.

Subjek and Method: This is a quantitative research with *cross sectional study* design. This research is done in the District of Northwest Sumba, East Nusa Tenggara Province. Subject of this research is elementary schoold students with number of sampels are 105 students chosen by using Multistage Random Sampling Technique. Independent Variabel is the *Infektion of Soil Transmitted Helminth* and dependent variabel is Anemia. Data collecting technique is by checking the faeces using *direct method* and by checking capiler blood using strip test method, continued by interviewing using quisionaire and analyzed using simple Logistic Regression.

Result: Number of Infektion of *Soil Transmitted Helminth* (STH) cases in elementary school students in the District of Northwest Sumba is 40%. Worms' egg found majority are *Ascaris lumbricoides* and *Trichuris trichiura* (38.1%), in a single infection was found *Ascaris lumbricoides* (31%) and *Trichuris trichiura* (21%), and the minority worms found were *Hookworm Ancylostoma duodenale* (2.4%). Number of anemia cases in Elementary School students is 57.1%. Statistic examination test shows that the infection of *Soil Transmitted Helminth* (STH) positively and significantly affects the anemia cases with (OR= 27,3; 95% CI = 13,1-57,0; $p = 0.001$).

Conclusion: The probability of infection of *Soil Transmitted Helminth* (STH) positively and significantly affects the anemia cases in Elementary School Students.

Keywords: soil, transmitted, helminth, Anemia, elementary school students

1. Introduction

Anemia is a condition where a human body suffers lack of eritrosit. Anemia could happen due to less haemoglobin which means less oxygen throughout the body. When oxygen is less then that person will feel weak. This sickness' indication could be known through the checking of lower eyelid, hands' and feet's nail tip and mouth mucous. According to WHO a person could be diagnosed with anemia when haemoglobin content in men's < 13 g/dl, children aged 12–13 and women not pregnant < 12 g/dl, children aged 6 months to 5 years and pregnant women < 11 g/dl. Children aged 5-11 years < 11.5 g/dl. (Departemen Kesehatan Republik Indonesia, 2006)

Kasuma's research result (2016) prevalence of anemia in Elementary School Students in SDN Oetona Kupang City shows 56.2%, according to gents, anemia cases are more in boys (60.3%) and girls 39.7%. This result goes hand in hand with the result from Aryani in Local Government Clinic in Bajaranakan II, where anemia prevalence in Elementary School Students is 51.8% and it happens more in boys (55.2%). (Departemen Kesehatan Republik Indonesia. 2007)

Research of Sirajudin, cs (2015) with majority participants are male students and students aged 10-11 years shows that anemia cases are prominent in students with worms (51.6%) that students without worms (27.6%). (Depkes,

2010)

Worms is an infectious sickness caused by worms' parasites that endangers health. Worms sickness that usually infects and gives very bad affect is worms infection transmitted through soil or usually called *Soil Transmitted Helminthes* (STH). Regarding STH, people still find it unimportant, since it can't cause death. Although in reality the impact of STH can cause health decreament even death. (Direktorat Jenderal & PL Kemenkes, 2013)

Worms mainly found in territory with high humidity especially in society with bad personal hygiene and environment's sanitation. Kinds of worms that dangerous are roundworms (*Ascaris lumbricoides*), hookworm (*Ancylostoma duodenale* and *Necutor americanus*) and *Trichuris trichiura*. (Kartini, 2016)

STH's infection can give a grave impact on health both directly and indirectly. Directly, STH could affects supply and absorption and food metabolism to human body. Cumulatively, STH caused disadvantages like decreasing in kalori and protein and lost of blood. Besides, decreasing nutritious, STH can impede physical growth, intelligence, working productivity, and decrease body's immunity which makes body is susceptible to disease and other infections. (Kartini, 2016)

According to data of WHO worms cases in the world are still high where 1 billion people are infected by *Ascaris lumbricoides*, 795 million are infected by *Trichuris trihiura* and 740 million are infected by *Hookworm*. (Mardiana, 2014)

While according to data of Health Ministry of Indonesia in 2006, based on survey done by sub-unit diarrhea on 2002 and 2003 in 40 elementary schools in 10 provinces, STH's prevalence is about 2.2%–96.3%. Another survey done by Yayasan Kusuma Bangsa (YKB) in 2006-2007, average prevalence number of worms in East Jakarta is 2.5% and in North Jakarta 7.8%. Another Survey on 2009-2010 done in the Province of South Sulawesi showed that average worms' prevalence is 27.28%. In 2011 data collected through survey done in several Districts/Cities, got various numbers: District of Lebak and Pandeglang has high average that is 62% and 43.78%, in the District of Sleman in Jogjakarta the prevalence is 21,78%, in the District of West Lombok and Mataram City shows the prevalences 29.47% and 24,53%. And the last, in the District of West Sumba, the prevalence is 29.56%. (Kasuma, 2016). According to those data, it means that Indonesia is an endemic region with STH.

In the provionce of NTT itseld, according to the research done by Fridolina Mau in 2017 in the District of West Sumba and Central Sumba, stated that 568 students of Elementary School (91.0%) infected by STH. The highest prevalence is infectious of A. Lumbricoides 28.5%, followed by T. Trichiura 5.9% and mixed infection 65.6% in the district of West Sumba, and in Central Sumba the highest prevalence is A. Lumbricoides 30.0%, followed by T. Trichiura 17.1% and mixed infection 46.8%. (Mau, 2017)

Factors that encourage endemic of hookworm is nature factor: tropical weather that supports the growth of worms' eggs and larva. Clay is a kind of soil that suitable for the growth of roundworms and hookworms, while sandy soil is suitable for T. Trichiura. High humidity also supports the growth of worms' eggs. While sunshine and wind could fasten the drying and spread the eggs of T. Trichiura in dust [9]. Another factor is household environment. School children are members of family that still need control in their everyday activity. Regarding health, playing behaviour should be put full attention especially in regards to sanitation condition of household environment. A good household sanitation will surely give safe and comfy for the children to play. In rural society, it is common when children play with their friends' in house yard and garden. In this case, there should be vigilance of possibility for children get in touch with hookworms that in fact needs soil to get multiplied. (Sumanto, 2010)

Infection can happen to all age, whether it is to babies, children, or even adults. Most of infection cases happen to school chidren because in that age there are many contacts with soil. (Syahrir & Sukfitrianty dan, 2016)

2. Subject and Method

This research uses analytical research with quantitative approach by using cross sectional study design. This research is done in Government and Privat Elementary School in 3 subdistricts in the District of Northwest Sumba. The number of samples is 105 students from 1st – 6th grade which consists of 48 samples from government and privat Elementary School in the Subdistrict of West Wewewa, 16 samples from government and privat Elementary School in the Subdistricts in Waitabula City, and 41 samples from government and privat Elementary School in the Subdistrict of Kodi. Each sample is chosen through *Multi Stage Random Sampling* technique. To every sample child, it is done faeces check microscopically by direct checking method using NaCl, and interview.

3. Research's Result

Tabel 1. Distribution of respondents' characteristics

School Childres's Characteristics		Amount	%
Age	- 6- 12 years	104	99
	- > 12 years	1	1
Gender	- Male	35	33,3
	- Female	70	66,7
Fathers' education	- None	3	2,9
	- elementary school	23	21,9
	- junior high school	25	23,8
	- senior high school	39	37,1
	- college	15	14,3
Mothers' education	- None	4	3,8
	- elementary school	20	19,0
	- junior high school	22	21,0
	- senior high school	37	35,2
	- college	22	21,0
Fathers' Occupation	- None	4	3,8
	- Farmer/Labourer/Fisherman	68	64,8
	- Entrepreneur	18	17,1
	- Civil Officer	15	14,3
Mothers' Occupation	- None	47	44,8
	- Farmer/Labourer/Fisherman	33	31,4
	- Entrepreneur	4	3,8
	- Civil Officer	21	20
Family Income	- < 1.500.000	75	71,4
	- 1.500.00- 2.000.000	8	7,6
	- 2.000.000-3.000.000	14	13,3
	- > 3.000.000	8	7,6
School's Status	- Privat	72	68,6
	- Government	33	31,4
Class/Grade	- First	24	22,9
	- Second	30	28,6
	- Third	26	24,8
	- Fourth	15	14,3
	- Fifth	10	9,5

The characteristics of the most Elementary School Children is 6–12 years old (99%) and female gender (66.7%) while the rest are male. Most of the fathers' last education grade are Senior High School (37.1%), and so are the mothers' (35.2%). Fathers' occupations are farmer (64.8%), mothers' occupations are none (44.8%) with few are entrepreneur (3.8%). Most of family income amount is < 1.500.000/month and few are > 3.000.000/month 7.8%). Most of the schools' status are privat (68.6%) and the rest are government. Number of students are almost the same

in each grade although students in 1st, 2nd, and 3rd grade are more than other grade.

Table 2. Distribution of elementary school children with STH cases in the district of Northwest Sumba

Number of Cases		Amount	%
STH Cases	- Postive	42	40,0
	- Negative	63	60,0
Kinds of STH	- <i>Ascaris lumbricoides</i>	13	31,0
	- <i>Trichuris trichiura</i>	9	21,4
	- Hookworm <i>Ancylostoma duodenale</i>	1	2,4
	- Hookworm <i>Necator americanus</i>	3	7,1
	- Mix AL and TT	16	38,1
Total		42	100

Research's result shows that 40% of Elementary School Children in the District of Northwest Sumba are infected by *Soil Transmitted Helminth* (STH). Based on check-up results, kinds of worms found most is *Ascaris lumbricoides* (31%), *Trichuris trichiura* (21.4%) and mixed *Ascaris lumbricoides* and *Trichuris trichiura* 38.1%.

Table 3. Distibution of Anemia Cases in Elementary School Children in the District of Northwest Sumba

Number of Cases	Amount	%
Anemia	60	57.1
Non-anemia	45	42.9
Total	105	100

Research's result shows that 57.1% Elementary School Children in the District of Northwest Sumba are infected by anemia.

Table 4. The Impact of STH Infection to Anemia Cases in Elementary School Children

No	STH	Anemia		Total (%)
		Anemia	Not	
1	Positive	33 (31.4%)	9 (8.6%)	42 (40.0%)
2	Negative	27 (25.7%)	36 (34.3%)	63 (60.0%)
Total		60 (57.1%)	45 (42.9%)	105 (100.0%)

B = -1.299;

P Value = 0.001;

Exp. B = 27.3;

CI 95% = 13.1-57.0.

The result shows that infection of *Soil Transmitted Helminth* (STH) 31.4% is in children with anemia. Statistic test shows that STH infection significantly affects anemia cases with p value = 0.001. Exp. B (OR) = 27.3, this shows that children infected with *Soil Transmitted Helminth* (STH) is risked 27.3 times with anemia than children without STH infection.

4. Discussion

Worms is an infectious sickness caused by worms' parasites that endangers health. Worms sickness that usually infects and gives very bad affect is worms infection transmitted through soil or usually called *Soil Transmitted*

Helminthes (STH). Regarding STH, people still find it unimportant, since it can't cause death. Although in reality the impact of STH can cause health decrement even death (Depkes, 2010).

This research result shows that 40% of Elementary School Children in the District of Northwest Sumba infected by *Soil Transmitted Helminth* (STH). This is different from the research done by Mau (2017) that stated 91.0% of Elementary School Children in the Districts of Northwest Sumba and Central Sumba are infected with *Soil Transmitted Helminth* (STH). The research of Kartini Sri (2016) in Sumbdistrict of Rumbai Pesisir Pekanbaru shows 16.3% infected with STH. (Surajuddin & Masni, 2015)

While research of Syahrir, Sukfitrianty cs in Subdistrict of Wera Bima Nusa Tenggara Barat shows that infection of STH in Elementary School Children is 59.5%. (World Health Organization, 2011)

The most variety of worms' eggs are miced of *A. Lumbricoides* and *T. Trichiura*, compare to research's result of Fridolina (2017), the highest prevalence is infection of *A. Lumbricoides* 28.5%, followed by *T. Trichiura* 5.9%. (Mau, 2017). The difference of STH's infections numbers between district of Northwest Sumba, West Sumba, and Central Sumba are caused by school children in Northwest Sumba are regularly get anti-*helminth* medicine from Central Government Clinic, although still some are infected with it. Other factor that affect high number of STH's infection is lack of personal hygiene such as not using footwear when doing outdoor activities, not washing hands and feet after direct concat with soil, the habits of playing with mud, finger nails not regularly cut and direct contact with friends that makes worms' eggs easily move.

Anemia is a condition where a human body suffers lack of eritrosit. Anemia could happen due to less haemoglobin which means less oxygen throughout the body. When oxygen is less then that person will feel weak. This sickness' indication could be known through the checking of lower eyelid, hands' and feet's nail tip and mouth mucous. According to WHO a person could be diagnosed with anemia when haemoglobin content in men's < 13 g/dl, children aged 12–13 and women not pregnant < 12 g/dl, children aged 6 months to 5 years and pregnant women < 11 g/dl. Children aged 5–11 years < 11.5 g/dl. (Departemen Kesehatan Republik Indonesia, 2006)

This research's result shows that 57.1% of Elementary School children in the district of Northwest Sumba are infected with anemia. This result is almost similar with research done by Kasuma (2016) about prevalence of anemia in Elementary School Children in SDN Oetona Kupang City that showed 56.2%. (Departemen Kesehatan Republik Indonesia, 2007) This can be caused by various factors, among which eating and sleeping pattern, kinds of food consumed, and other sickness that triggers anemia. According to Sarjuddin S (2015), the habit of eating breakfast and food consumed significantly affected to anemia cases. (Depkes, 2010)

Worms is an infectious sickness caused by worms' parasites that endangers health. Worms sickness that usually infects and gives very bad affect is worms infection transmitted through soil or usually called *Soil Transmited Helminthes* (STH). Regarding STH, people still find it unimportant, since it can't cause death. Although in reality the impact of STH can cause health decrement even death (Depkes, 2010).

The result shows that there is effect of *Soil Transmited Helminthes* (STH) infection towards anemia cases in Elementary School Children. This result is similar to Sarjudin S that stated 51.6% of Elementary School children suffer from anemia. Statistic test shows that there is relation between worm's infection with anemia cases in Elementary School children. Usually, infection of *Soil Transmitted Helminth* (STH) is found in children with anemia. This caused by in case of STH infection worms do not only take the nutrition in intestines, but also absorbs blood cells in children's body that makes the body suffers anemia.

4.1 Research's Ethic

Explain to parents and school children and ask parents' agreement on taking specimen of faeces and blood. Guarantee the privacy and anonymity.

4.2 Appreciation

Researchers' gratitude is for the Director of Health Polytechnic of Health Ministry in Kupang, the Government of Northwest Sumba District, and scool children's parents whoo gave their full support in this research.

5. Conclusion

- 1) Number of soil transmitted helminth (STH) infection cases in elementary school children in the District of Northwest Sumba in 2018 is 40%. Most of worms' eggs found were *Ascaris lumbricoides* and *Trichuris trichiura* (38.1%).
- 2) Number of anemia cases in elementary school children in the District of Northwest Sumba in 2018 is 57.1%

- 3) Infeksi of soil transmitted helminth (STH) 31.4% in elementary school children suffer from anemia.
- 4) There is a significant and positive effect of soil transmitted helminth (STH) infection to anemia cases in elementary school children in the District of Northwest Sumba.

5.1 Recommendation

To reduce number of anemia cases in elementary school children in Northwest Sumba, it is suggested to Regional Government through the Department of Health so that it can be proceeded by giving anti-Helminth medication massively at least once in 6 months to elementary school children and keep the promotion of health regularly in schools about STH effect to anemia in children.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

References

- Departement Kesehatan Republik Indonesia. (2006). *Pedoman Pengendalian Cacingan*. Jakarta: Lampiran Keputusan Menteri Kesehatan RI.
- Departement Kesehatan Republik Indonesia. (2007). *Profil Kesehatan Indonesia 2008*. Jakarta: Departemen Kesehatan RI.
- Depkes, R. I. (2010). *Profil Kesehatan Indonesia*. Jakarta : Depkes RI
- Direktorat Jenderal, P. P., & PL Kemenkes, R. I. (2013). *Profil pengendalian penyakit dan penyehatan lingkungan tahun 2012* (pp. 112-13). Jakarta: KEMENKES RI.
- Kartini, S. (2016). Kejadian Kecacangan pada Siswa Sekolah Dasar Negeri Kecamatan Rumbi Pesisir Pekanbaru. *Jurnal Kesehatan Komunitas Universitas Abdurrahman Pekanbaru*.
- Kasuma, N., & Made, O. A. (2016). *Faktor Penentu Kejadian Anemia Gizi pada Siswa Sekolah Dasar Oetona Kecamatan Kota Raja* (Tesis PS IKM Undana, Kupang).
- Mardiana, B. D. (2014). *Kasus Kecacangan Pada Murid Sekolah Dasar Di Kecamatan Mentewe, Kabupaten Tanah Bumbu Kalimantan Selatan Tahun 2010* (pp. 255-264)
- Mau, F. (2017). Prevalence and Intensity of Soil-Transmitted Helminth Infections Among Elementary School Students in West Sumba and Central Sumba Districts East Nusa Tenggara, Indonesia. *Journal of Medical Science and Clinical Research*, 5(10), 28988-28994.
- Sumanto, D. (2010). *Faktor Risiko Infeksi Cacing Tambang Pada Anak Sekolah 6*. Retrieved from <http://jurnal.htp.ac.id/index.php/keskom/article/view/102>
- Surajuddin, S., & Masni. (2015). Kejadian Anemia pada anak sekolah dasar. *Jurnal Kesehatan Masyarakat Nasional*, 9(3). Makasar.
- Syahrir, & Sukfitrianty dan, A. (2016). Faktor Yang Berhubungan Dengan Kejadian Kecacangan Pada Siswa SDN Inpres No. 1 Wora Kecamatan Wera Kabupaten Bima. *Jurnal Higiene*.
- WHO. (2011). *Manual of basic techniques for a health laboratory* (2nd). Geneva: WHO.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).