Prevalence of Intestinal Parasitic Infections among Aborigine Children in *Kampung* Ulu *Gerik, Perak*

Anita Talib[1], Adibah Hanum Sahari[2] and Nazar Mohd Zabadi B. Mohd Azahar [2]
[1]*School of Distance Education, Biology Section, Universiti Sains Malaysia, Minden, Penang 11800. Malaysia*
[2]*Department Faculty of Health Science, University Teknologi MARA (UiTM) Bertam, Penang, Malaysia*

Keywords: Ethnobiology, intestinal parasitic infections, helminths, indigenous children, polyparasitism

Abstract: Intestinal parasitic infections among indigenous children have been identified as one of the important public health problems among the disadvantaged population. The prevalence of these infections causes significant illnesses and diseases among children. This cross-sectional study was conducted to determine the prevalence of intestinal parasitic infections and their associated risk factorsamong children aged 2 to 14 years in Perkampungan Orang AsliUluGerik, Perak. A total of 75 faecal samples were obtained in this study. Results from our study showed that the intestinal parasitic infections were prevalent among indigenous children. Infection by *Trichuristrichiura* was the most common infection (65.3%), followed by Hookworm (46.7%), *Ascarislumbricoides* (42.7%) and *Entamoeba* spp. (16.0). Only 1.3% of children had *Giardia* spp. infection. More than half of the children in this study hadpolyparasitism representing 54.7%. Social and environmental factors such as Father's occupation (p=0.019), water sources (p=0.039), type of toilet (p=0.026) and intake of the supplement (p=0.021) were significantly associated with polyparasitism. Promotion of preventive measures such as deworming, increase of awareness on healthy lifestyle and improvement in housing facilities are urgently needed to reduce the intestinal parasitic infections in this community.

SCIENCE AND TECHNOLOGY PUBLICATIONS

1 INTRODUCTION

Intestinal parasitic infection among indigenous people is one of the critical public health problems (Hartini et al., 2013). The World Health Organization (WHO, 2015) has highlighted that 24% of people have been infected with intestinal parasitic infections such as protozoan infections and soil-transmitted helminths (STH). Majority of infected people are residing in the developing countries (Hartini et al., 2013). Demographic changes and rapid socio-economic development in Malaysia have resulted in high endemic of intestinal parasitic infection among indigenous communities especially among children (Chin et al., 2016). In Peninsular Malaysia, indigenous communities are minority groups of people separated into three main tribal groups: Semang (Negrito), Senoi and Proto-Malay (Aboriginal Malay) consisting of 19 ethnicities (Chin et al., 2016). They have various lifestyles, having unique languages, knowledge systems and invaluable knowledge of practices for the sustainable management of natural resources (Tarmiji et al., 2013).

The high prevalence of parasitic infection is associated with poverty, poor environmental conditions, lack of clean water, lack of proper faecal disposal, growth impairment, school performance and cognitive function of children (Norhayati et al., 2003). Transmitting of intestinal parasites by faecal-oral route and infection can be severe if left untreated and if the immune system is weak (Norhayati et al., 2003). The main presenting symptoms for intestinal parasitic infections are diarrhoea, fever, nausea and vomiting (Sinniah et al., 2012). The most common STH found in Malaysia are *Ascarislumbricoides*, *Trichuristrichiura* and hookworm (Norhayati et al., 2003). The most predominant intestinal protozoan infections are giardiasis caused by *Giardia duodenalis*, followed by amoebiasisand caused by *Entamoebahistolytica* (Romano et al., 2011).

There are three methods of STH transmission: direct, modified direct and through penetration of

Tallib, A., Sahari, A. and Azahar, N.
Prevalence of Intestinal Parasitic Infections among Aborigine Children in Kampung Ulu Gerik, Perak.
DOI: 10.5220/0008882400970102
In *Proceedings of the 7th International Conference on Multidisciplinary Research (ICMR 2018)* - , pages 97-102
ISBN: 978-989-758-437-4
Copyright © 2020 by SCITEPRESS – Science and Technology Publications, Lda. All rights reserved

the skin (Sina et al., 2012). Intestinal parasitic infections are still prevalent among indigenous children, ranging from 66.2% to 79.8% (Rahmah et al.,1997; Yusof and Abd. Ghani 2011; Leroy and Chua, 2016). In 2003, the World Health Organization (WHO) revealed that soil-transmitted helminthiasis had an adverse effect on growth and development of children aged 2-14 years old. Thus, the parasitic diseases will continue to threaten the people's health especially among communities from rural areas if no appropriate actions are taken to diminish the transmission of the parasites (Hartini et al.,2013). Since the 1930s, numbers of research have been conducted on intestinal parasitic infection mainly soil transmitted helminths as they are believed to be one of the tremendous medical importance among children living in remote areas. Intestinal parasitic infections are significantly associated with environmental and personal hygiene practices (Lim et al., 2009). This study highlights the prevalence and risk factors for intestinal parasitic infection among aborigine children in Malaysia. Such information is important for the respective parties to implement strategies or intervention to reduce the risk of getting intestinal parasitic infection among children.

2 MATERIAL AND METHODS

2.1 Study Site

The present study was conducted within the area of HuluGerik, an area located in the north-eastern state of Perak; on the east side of the state, a boundary with the state of Kelantan, while in the north west, with PengkalanHulu. In the south of this area is the district of Lenggong. Bordering with Thailand on the northeast, this area is also one of the gateways between Malaysia and Thailand. The south-western part of the area is Larut, Matang and Selama.
Participants from this study were children aged 2 to 14 years old residing in Perkampungan Orang Asli, UluGerik. Data collection was started on December 2017 and ended in March 2018.

2.2 Sampling Techniques

A clean, wide-mouth screw-cap container pre-labeled with the individual's name and code for the collection of faecal sample, 10% formalin, 15ml Falcon tube, applicator wood stick, distilled water, centrifuge, ethyl acetate, iodine 0.05 MOL/1(0.1N), transfer pipette 3ml, microscopic slide frosted end, microscopes coverslips and light microscope.

Stool specimens were collected from children aged 2 to 14 years old. For children aged under 4 years, the stool collection was done by assistance from their parents or guardians. The samples were collected on the following day. The fresh stool samples were added immediately with 10% formalin and placed into the ice box before transported back to the Parasitology laboratory, Faculty of Health Sciences, UniversitiTeknologi MARA (UiTM) Bertam, Penang on the same day of collection. Each stool sample was fixed with 10% formalin and stored at 4°C to 10°C until further analysis.

2.3 Formalin-ethyl ether Sedimentation Techniques for Detection of Intestinal Parasites

Stool sample fixed with 10% formalin was mixed well using wood applicator stick. Approximately 5ml of each formalinized specimen was strained through one layer of wet gauze into a 15ml Falcon tube. Distilled water was added to a volume of 10ml. The suspension was mixed well and centrifuged at 1500 rpm for 2 minutes. Then, the supernatant was decanted using Pasteur pipette and distilled water was added again to a volume of 10ml. By using a micropipette, 3ml of ethyl acetate was added to each tube. The tube was screwed with cap and shake vigorously for 30 seconds. Then the mixture was centrifuged with a table model centrifuge at 1500 rpm for 2 minutes. After centrifugation, it became four layers: ether, debris, formalin and faeces. The supernatant was discarded. The pellet was suspended in residual water and homogenized with gentle stirring. Slide for observation was labelled with respondent's identification code. A small drop of pellet and iodine was placed on the slide for examination.

Figure 1 : The map of Perak showing the location of Gerik (Pejabat Tanah dan Daerah Hulu Perak).

3 RESULTS AND DISCUSSIONS

In this cross-sectional study there were 75 children aged 2-14 years old participated. The mean age of children was 6.4±3.4 years. Almost half of the children were aged 4 to 8 years (45.3%) and majority was female representing 54.7%. A third of children (35.7%) in this study wear shoes when they were outside house. Almost all (96.0%) of children in this study received complete vaccination from the nearest government health clinics. Parental information among children was assessed in this study. A majority of the fathers work as rubber tapper (54.7%) and 41.3% of them did not have any formal education. Meanwhile, most of the mothers were housewives (65.4%) and 53.3% of them did not have any formal education. The mean age of father was 40.6±9.4 years while 34.2±8.9 years for mothers. With regards to monthly household income, the mean was reported as RM309.3±121.0. In reference to the family size of participants, the mean total of kids in a family was 3.19±1.6 kids. Meanwhile, more than half of the respondents (53.3%) did not receive any financial assistance to support their daily life. With regards to their housing facilities, 45.3% of the respondents used treated water sources, 58.7% have television and 48% had radio. About two-thirds of the respondents (69.3%) did not have toilet facilities in their home while 68% of the respondents did not have proper defecation place status. Only 40% of the respondents had pet at their home. Nearly half of the respondents (46.7%) took supplement as their additional food. All respondents received antihelminthic agents and did not have any systematic garbage disposal (Table 1).

There were five intestinal parasites identified in this study: *Trichuristrichiura, Ascarislumbricoides*, Hookworm, Giardia spp. and Entamoeba spp. In total, 65.3% of children were infected by *Trichuristrichiura*, followed by Hookworm (46.7%), Ascarislumbricoides (42.7%) and Entamoeba spp. (16.0%). Only one child was infected by Giardia spp. and, 12.0% of children did not have any intestinal parasitic infection. Intestinal parasitic infection by *Trichuristrichiura*was the highest among male and female children representing 64.7% and 65.9% respectively. In total, there were 33.3% of children withmonoparasitism, 30.7% two parasites, 18.7% three parasites and 5.3% four parasites. The prevalence of children with polyparasitism (having at least two types of infection) in this study was 54.7%. The prevalence of intestinal parasitic infection by gender in this study was presented in Table 2. Our results showed that *Trichuristrichiura* was the highest intestinal parasitic infection among children. Similar to studies done by previous researchers in other sub-ethnic groups (Chin et al, 2016; Delaimy et al., 2014; Nasr et al., 2013; Ngui et al., 2015; Lee et al., 2014; Anuar et al., 2014; Sinniah et al., 2012). Delaimy et al., (2014) found that almost all children were positive for *Trichuristrichiura* infection (95.6%). One of the factors for the high prevalence of *Trichuristrichiura* infection might be due to occurrence of super infection. This occured when the children harboring the parasite was re-infected with similar parasite especially due to ineffective treatment against this infection (Ng et al., 2014). Our results also showed that Hookworm was the second highest intestinal parasitic infection. This finding is contradictory with studies done by other researchers (Chin et al., 2016; Nasr et al., 2013; Ngui et al., 2015; Anuar et al., 2014) whereby the infection by *Ascarislumbricoides* is the second most common intestinal parasitic infection among indigenous population followed by Hookworm infection. This might be due to the fact that the current study was conducted among Temiar sub-ethnic group meanwhile the previous studies were conducted

among Temuan and MahMeri sub-ethnic groups. Since the prevalence of infection by *Trichuristrichiura*, Hookworm and *Ascarislumbricoides*were high, this study hypothesized that the soil contamination with these parasites was higher in this indigenous community. In addition, most of the children in this study did not wear shoes (64.3%) and 68% of them did not have proper defecation place status. This will increase the rate of intestinal parasitic transmission in the community. However, this hypothesis should be further confirmed with soil analysis. The finding of the present study showed that most of the children had polyparasitism (54.7%). Only a third of the children had monoparasitism. The prevalence of polyparasitism in this study was lower compared to that reported by Delaimy et al., 2014 (71.4%). In another study a much higher prevalence of polyparasitism was found among respondents in western Cote d'Ivoire (Raso et al., 2014). However, the prevalence of polyparasitism in the current study was slightly higher compared to a study conducted by Chin et al., 2016. They found that the prevalence of polyparasitism among Temuan and Mah-Meri was 41.5% and 32.5% respectively. Current findings indicate that the environment among indigenous population is heavily contaminated with the parasites. It is important findings because children with polyparasitism may suffer from multiple morbidity due to each species infection (Booth et al., 1998).

Table 1: Socio-demographiccharacteristics of respondents.

Socio-demographic characteristics	**Frequency (n)**	**Percentage (%)**
Age groups (n=75)		
- Less than 4 years	20	26.7
- 4-8 years	34	45.3
- 9-12 years	21	28.0
Sex (n=75)		
- Female	41	54.7
- Male	34	45.3
Wear shoe (n=70)		
- Yes	25	35.7
- No	45	64.3
Father's occupation (n=75)		
- Farmer/Hunter	34	45.3
- Rubber tapper	41	54.7
Mother's occupation (n=75)		
- Rubber tapper	26	34.7
- Housewives	49	65.3
Father's educational level (n=75)		
- No formal education	31	41.3
- Primary school	29	38.7
- Secondary school	15	20.0
Mother's educational level (n=75)		
- No formal education	40	53.3
- Primary school	29	38.7
- Secondary school	6	8.0
Completed vaccination (n=75)		
- Yes	72	96.0
- No	3	4.0
Received financial assistance (n=75)		
- Yes	35	46.7
- No	40	53.3
Water sources (n=75)		
- Treated	34	45.3
- Not treated	41	54.7
Own television (n=75)		
- Yes	44	58.7
- No	31	41.3
Own radio (n=75)		
- Yes	36	48.0
- No	39	52.0
Type of toilet (n=75)		
- No toilet facilities	52	69.3
-Proper toilet facilities	23	30.7
Defecation place status =(n=75)		
- Other places	51	68.0
- Proper toilet	24	32.0
Own pet (n=75)		
- Yes	30	40.0
- No	45	60.0
Garbage disposal (n=75)		
- Systematic	0	0
- Not systematic	75	100
Antihelminthic drugs (n=75)		
- Yes	75	100
- No	0	0
Supplement (n=75)		
- Yes	35	46.7
- No	40	53.3
Mean respondent's age	6.4±3.4	
Mean father's age	40.6±9.4	
Mean mother's age	34.2±8.9	
Mean household income (RM)	309.3±121.0	

Table 2: Prevalence of intestinal parasitic infection by gender.

Intestinal parasitic infection	Male		Female		Total	
	n	%	n	%	n	%
Helminth infection	22	64.7	27	65.9	49	65.3
- *Trichuristrichiura*	10	29.4	22	53.7	32	42.7
- *Ascarislumbricoides*	15	44.1	20	48.8	35	46.7
- Hookworm						
Protozoan infection						
- *Giardia* spp.	1	2.9	0	0.0	1	1.3
- *Entamoeba* spp.	4	11.8	8	19.5	12	16.0
No intestinal parasitic infection	4	11.8	5	12.2	9	12.0
Monoparasitism	15	44.1	10	24.4	25	33.3
Two parasites	10	29.4	13	31.7	23	30.7
Three parasites	3	8.8	11	26.8	14	18.7
Four parasites	2	5.9	2	4.9	4	5.3
Polyparasitism	15	44.1	26	63.4	41	54.7

4 CONCLUSIONS

The results of the present study show the existence of intestinal parasitic infection among aborigine children. The prevalence of *Trichuristrichiura* infection is the highest in this study and there are 54.7% of respondents withpolyparasitism. Significant risk factors for polyparasitismare father's occupation, water sources, type of toilet facilities and intake of supplement. Findings from this study provide information for the responsible agencies to promote strategic plans to reduce the rate of intestinal parasitic infection among aborigine community. Our study highlights the possibility that polyparasitism could be affecting the health of young children especially in indigenous communities, hence Malaysian government should put on more efforts on preventive measures such as socio-economic development programmes to increase knowledge and awareness and to educate the aborigine community about disease control such as periodic chemotherapy, provision of safe water and improvement in hygienic practices.

ACKNOWLEDGEMENTS

Acknowledgements to School of Distance Education, USM for the support granted to this research in collaboration with Department of Faculty of Health Science, University Teknologi MARA (UiTM) Bertam, Penang. Gratitude is extended to the staff ofJabatanKemajuan Orang Asli (JAKOA) , and Head of Department of Faculty of Health Science, University Teknologi MARA (UiTM) Bertam, Penang, En. Amir Herberd B Abdullah at Clinical Research Laboratory for their support and assistance.And to Head of Villages atPerkampungan Orang AsliUluGerik, Perak and their respective committees for their assistance in data collection.

REFERENCES

Anuar, T.S., Salleh, F.M., Moktar, N., 2014. Soil-transmitted helminth infections and associated risk factors in three Orang Asli tribes in Peninsular Malaysia.*Sci Rep* 4:4101.

Booth, M., Bundy, D.A.P., Albonico, M., Chwaya, H.M., Alawi, K.S., Savioli, L., 1998. Associations among multiple geohelminth species

Chin, Y. T., Lim, Y. A. L., Chong, C. W., The, C. S. J., Yap, I. K. S., Lee, S.C., Tee, M. Z., Siow, V.W.Y and Chua, K. H., 2016. Prevalence and risk factors of intestinal parasitism among two indigenous sub-ethnic groups in Peninsular Malaysia. *Infectious Disease of Poverty* 5: 77.

Delaimy, A.K., Al-Mekhlafi, H.M., Nasr, N.A., Sady, H., Atroosh, W.M., Nashiry, M., et al., 2014.Epidemiology of intestinal polyparasitism among Orang Asli school children in rural Malaysia.*PLoSNegl Trop Dis* 8:e3074.

Hartini, Y., Geishamimi, G., Mariam, A.Z., Mohamed-Kamel, A.G, Hidayatul, F.O. and Ismarul, Y.L., 2013. Distribution of Intestinal Parasitic Infections Amongst Aborigine Children at Post Sungai Rual, Kelantan, Malaysia. *Tropical Biomedicine* 30(4): 596-601.

Lee, S.C., Ngui, R., Tan, T.K., Muhammad Aidil, R., Lim, Y.A.L., 2014. Neglected tropical diseases among two indigenous subtribes in peninsular Malaysia: highlighting differences and co-infection of helminthiasis and sarcocystosis. *PLOS One* 9:e107980.

Leroy, A.L., Chua, T. H., 2016. Worm infection among children in Malaysia.*Borneo journal of medical sciences*. 10(1) :59-74

Lim, Y.A.L, Romano, N., Colin, N., Chow, S.C. and Smith, H.V., 2009. Intestinal parasitic infections amongst Orang Asli (indigenous) in Malaysia: Has socioeconomic development alleviated the problem? *Tropical Biomedicine* 26(2): 110-122.

Nasr, N.A., Al-Mekhlafi, H.M., Ahmed, A., Roslan, M.A., Bulgiba, A., 2013.Towards an effective control programme of soil-transmitted helminth infections among Orang Asli in rural Malaysia. Part 1: prevalence and associated key factors. *Parasit Vectors* 6:27.

Ng, J.V., Belizario,J.r. V.Y, Claveria, F.G., 2014. Determination of soil-transmitted helminth infection and its association with hemoglobin levels among Aeta schoolchildren of Katutubo Village in Planas, Porac, Pampanga. *Phil SciLett*. 7: 73–80.

Ngui, R., Aziz, S., Chua, K.H., Aidil, R.M., Lee, S.C., Tan, T.K., et al., 2015. Patterns and risk factors

Norhayati, M., Fatmah, M.S., Yusof, S. and Edariah, A.B., 2003. Intestinal parasitic infection in man: A Review. *Medical Journal of Malaysia* 58: 296-305

Pejabat Tanah dan Daerah Hulu Perak.Geografi Daerah. http://pdtgerik.perak.gov.my/profil/informasi-daerah/geografi-daerah. Access on 30 September 2017

Rahmah, N., Ariff, R.H., Abdullah, B., Shariman, M.S., Nazli, M.Z. and Rizal, M.Z., 1997. Parasitic infections among aborigine children at Post Brooke, Kelantan, Malaysia.*Medical Journal of Malaysia* 52: 412-414.

Raso, G., Luginbu¨hl, A., Adjoua, C.A., Tian-Bi, N.T., Silue´, K.D., et al., 2004.Multiple parasite infections and their relationship to self-reported morbidity in a community of rural Coˆte d'Ivoire.*Int J Epidemiol* 33: 1092–1102.

Romano, N., Saidon, I., Chow, S.C., Rohela, M. and Yvonne, A.L.L., 2011.Prevalence and Risk Factors of Intestinal Parasitism in Rural and Remote West Malaysia.*PLoS Neglected Tropical Diseases* 5(3): e974.

Sina, H., Akre, M.A., Alia, T. and Neil, A., 2012.Soil-transmitted helminths.*Global Health Education Consortium.*

Sinniah, B., Sabaridah, I., Soe, M.M., Sabitha, P., Awang, I.P.R., Ong, G.P. and Hassan, A.K.R., 2012. Determining the prevalence of Intestinal Parasites in Three Orang Asli (Aborigines) communities in Perak, Malaysia.*Tropical Biomedicine* 29(2): 200-206.

Tarmiji, M., Fujimaki, M., Norhasimah, I., 2013. Orang Asli in Peninsular Malaysia*: Population, Spatial Distribution and Socio-Economic Condition.*www.ritsumei.ac.jp/acd/re/k-rsc/hss/book/pdf/vol06_07.pdf. Access on 11 November 2017.

World Health Organization : Soil-transmitted helminth infections. Fact sheet no. 366 updated May 2015. http://www.who.int/mediacentre/factsheets/fs366/en/ Accessed 09 February 2018.

Yusof, H. and Abd.Ghani, M.K., 2011. Intestinal parasitic infections among Orang Asli children at PosLenjang, Pahang.*First Regional Health Sciences and Nursing Conference* 2011.