

## Determining the prevalence of intestinal parasites in three Orang Asli (Aborigines) communities in Perak, Malaysia

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**Abstract.** This study was conducted to determine the prevalence of intestinal parasites among children and adult Orang Aslis (Aborigines) from different locations in Perak. Faecal samples were collected and analyzed using the direct smear and formal ether sedimentation technique. Some of the faecal samples were stained using the Modified Acid fast stain for *Cryptosporidium*. Nail clippings of the respondents and the soil around their habitat were also analyzed. Of the 77 stool samples examined, 39 (50.6%) were positive for at least one intestinal parasite. The most common parasite detected was *Trichuris trichiura* (39.0%) followed by *Ascaris lumbricoides* (26.9%), *Entamoeba coli* (5.2%), *Giardia lamblia* (5.2%), *Blastocystis hominis* (3.9%), hookworm (3.9%), *Entamoeba histolytica* (1.3%), *Iodamoeba butschlii* (1.3%) and *Cryptosporidium* sp. (1.3%) respectively. Some respondents had single parasites (24.7%), some with two parasites (18.2%). Some with three parasites (6.5%) and one had four parasites species (1.3%). The parasites were slightly more common in females (54.7%) than males ((41.7%). The parasites were more common in the 13-20 year age group (90.9%) followed by 1-12 years (69.6%), 21-40 year age group (34.8%) and least in the 41-60 year age group (27.8%). Nail examinations of the respondents did not show any evidence of parasites. One had a mite, three had pollen grains and one had yeast cells isolated from the finger nails. Soil samples taken around their houses showed only one sample with a nematode ova and one with oocyst which was of a non human origin.

### INTRODUCTION

Parasitic diseases have been a major public health problem of man for centuries and are still a big problem in many of the developing countries especially in the tropics and semi tropical countries of the world. Intestinal parasitic infections are commonly found especially in the rural and urban slum areas of tropical and semi tropical countries in the world. Diarrhoea, dysentery, anaemia, malabsorption, retarded growth and absenteeism from school and work are important health and social problems caused by intestinal geohelminths and protozoan infections. The high prevalence rate is usually associated with poverty, poor environmental conditions, lack of clean water and proper faecal disposal. The Orang Asli

(Aborigines) tribes are minority groups of people who dwell mainly in the tropical forests of the lowlands and hills in peninsular Malaysia. Intestinal parasites are particularly common among children from disadvantaged communities in both rural and urban slums. Several studies conducted on the Orang Asli communities over the years shows that the problem has not improved much (Bolton, 1968; Dunn, 1972; Dissanaiké *et al.*, 1977; Noor Azian *et al.*, 2007; Lim *et al.*, 2009; Sinniah *et al.*, 2010; Tengku & Norhayati, 2011). For a long time the Orang Aslis lived a nomadic lifestyle, hunting, fishing, gathering fruits and herbs for sale or part-time cultivators. Since the deforestation and cultivation of large tracks of forest by multinational companies for palm oil, rubber and logging for timber, the way of the life of

the Orang Asli has changed drastically over the last two to three decades. The efforts of the government to bring them to modern life through education, health and employment have brought some changes to the health of the Orang Asli communities. This has resulted in better living standards and health. Despite the government's effort to improve the livelihood of the Orang Asli, the older people in the community still remained poor because of their lack of basic education and resistance to change. Currently many of the Orang Asli tribes live outside the forest and many of their villages are located close to small towns and semi rural areas and live in proper houses with clean water supply. The aim of this study is to determine whether the prevalence of intestinal parasitic infections among the Orang Asli communities in Perak has decreased over the past two decades.

## MATERIALS AND METHODS

### Study areas

A cross-sectional parasitological survey was carried out in 3 areas namely; Pos Poi, Perak; Kampong Kerawat and Pergum, Sungai Pulai, Perak; and Kampong Pelantok, Sungai Siput, Perak. Only those who volunteered in the three areas were recruited for the study that was conducted in 2011. Of the 179 containers distributed only 77 returned the containers with stool, comprising 24 males and 53 females.

Soil samples was collected from the top 2-4 cm layer of the ground using a spoon from several vicinity around the houses especially near the toilet, under the houses and places where the children play. The soil samples

were stored in the laboratory refrigerator and examined using the brine floatation method. The soil were also soaked in saline overnight, decanted several times and centrifuged and the final sediment was examined for parasites.

Nail clippings were taken from most of the respondents who gave their stool sample and stored in a tube. The nail clippings were placed in 5 mls of formal saline overnight and centrifuged and the sediment examined for ova.

### Stool collection and examination techniques

Only those who volunteered for the study were given instructions on how to collect the stool. Each respondent was given a plastic container marked with an identification number with their name. Their biodata was also collected. The stool samples were stored in the refrigerator at 0°C and were examined using the direct smear and formal ether sedimentation technique. Stool samples that were suspected for *Cryptosporidium* were stained using the Modified Acid fast stain.

## RESULTS

A total of 77 respondents participated in this study. Of the 77 respondents, 39 (50.6%) were positive for at least a single parasite. Males had 41.7% infection rates and females with 54.7% infection rates as shown in Table 1. Nematode infections were found in 36/77 (46.7%) of the respondents and 13/77 (16.9%) of the respondents were infected with protozoan parasites. The infections were more common in the 13-20 year age group

Table 1. Prevalence of intestinal parasites among Orang Asli communities living in Perak in relation to gender

Residence	No. of respondents	No. Pos (%)	Gender	
			No. males (%)	No. females (%)
Kg Pelantok	11	2 (18.2)	4 0 (0%)	7 2 (28.6)
Kg Karawat	20	5 (20)	5 1 (20.0)	15 4 (26.7)
Pos Poi	46	32 (69.6)	15 9 (60.0)	31 23 (74.2)
Total	77	39 (50.6)	24 10 (41.7)	53 29 (54.7)

(90.9%) followed by the 1-12 year age group (69.6%), 21-40 year age group (34.8%) and the 41-60 year age group (27.8%) as shown in Table 2. The most common parasite detected was *Trichuris trichiura* (39%) followed by *Ascaris lumbricoides* (29.2%), *Giardia lamblia* (5.2%), *Entamoeba coli* (5.2%) and hookworm (3.9%) infection. Single infections (24.7%) were more common than double (18.2%), triple (6.5%) and quadruple (1.3%) infection as shown in Table 3.

The overall prevalence of intestinal parasites in the Orang Asli communities in Malaysia varied between 99.2% to 50.6% during the past 39 years (1972 to 2011) as shown in Table 4. During this period the prevalence of *Ascaris lumbricoides* varied between 97.8% to 19%; *Trichuris trichiura* from 80.9% to 10.8%; hookworm between 92.5% and 3.2%.

## DISCUSSION

Intestinal parasites are responsible for much morbidity among the urban squatter and rural populations of the developing countries. The Orang Asli (Aborigines) are mainly nomadic living in the rural areas with poorer housing and sanitary facilities compared to those living in traditional Kampongs (villages) or in the agricultural sectors. Many of the Orang

Asli villages are currently supplied with water brought in from upstream or stand pipes but they still preferred to walk barefooted and use the river for bathing, washing and eat food especially fruits and roots without washing or cooking. In this study, nine parasites (6 protozoa and 3 nematode) were identified. The prevalence of intestinal parasites among the Orang Asli communities in our study was low (50.6%) compared to other studies that showed a higher prevalence rate (Rahmah *et al.*, 1997; Noor Azian *et al.*, 2007; Al-Mekhalfi *et al.*, 2008; Sinniah *et al.*, 2010). However current study shows a lower prevalence rate and is similar to some studies that were carried out over the past two decades (Ghani *et al.*, 2002; Hakim *et al.*, 2007). Teklehaymanot (2009) states that in Ethiopia the prevalence of intestinal parasites among the tribes vary according to the seasonal migration and encampment. This may affect the actual results obtained: leading to false low or false high prevalence of infection. In Malaysia most of the Orang Asli communities used to migrate often but this practice has decreased over the past couple of decades. With better understanding of health and more permanent residence and better health care the prevalence of intestinal parasites among the Orang Asli has decreased from as high as 99.2%; 91.3% and 79.8% as reported by Dissanaik *et al.* (1977),

Table 2. Distribution of intestinal parasites among Orang Asli communities in Perak in relation to age groups

Parasites	Age groups (yrs)				Total No. Protozoa respondents
	1-12	13-20	21-40	41-60	
	No. Pos. (%)	No. Pos. (%)	No. Pos. (%)	No. Pos. (%)	No. Pos. (%)
<i>E. histolytica</i>	1/23 (4.3)	0/11 (0)	0/23 (0)	0/18 (0)	1 (1.3)
<i>E. coli</i>	0/23 (0)	2/11 (18.2)	1/23 (4.3)	1/18 (5.6)	4 (5.2)
<i>Giardia lamblia</i>	2/23 (8.6)	2/11 (18.2)	0/23 (0)	0/18 (0)	4 (5.2)
<i>I. butschlii</i>	0/23 (0)	0/11 (0)	1/23 (4.3)	0/18 (0)	1 (1.3)
<i>Cryptosporidium sp</i>	0/23 (0)	0/11 (0)	0/23 (0)	1/18 (5.6)	1 (1.3)
<i>Blastocystis</i>	2/23 (8.6)	1/11 (9.1)	0/23 (0)	1/18 (5.6)	4 (5.2)
<b>Nematodes</b>					
<i>A. lumbricoides</i>	10/23 (43.5)	6/11 (54.5)	5/23 (21.7)	2/18 (11.1)	23 (29.9)
<i>T. trichiura</i>	12/23 (52.1)	9/11 (81.8)	5/23 (20)	4/18 (22.4)	30 (39.0)
Hookworm	1/23 (4.3)	1/11 (9.1)	1/23 (4.3)	0/18 (0)	3 (3.9)
Total	16/23 (69.6)	10/11 (90.9)	8/23 (34.8)	5/18 (27.8)	39/77 (50.6)

Table 3. Polyparasitism among 77 Orang Aslis in Perak

No. of parasitic infections with	No. Pos.	% Pos. Parasite
<b>Single</b>		
<i>Ascaris lumbricoides</i>	4	5.2
<i>Trichuris trichiura</i>	10	13.0
<i>Giardia lamblia</i>	2	2.6
<i>Iodamoeba butchlii</i>	1	1.3
<i>Cryptosporidium sp</i>	1	1.3
<i>Blastocystis</i>	1	1.3
<b>Total single parasitic infections</b>	19	48.7
<b>Two Parasites</b>		
<i>Ascaris</i> + <i>Trichuris</i>	11	14.3
<i>Ascaris</i> + <i>E.coli</i>	1	1.3
<i>Trichuris</i> + <i>E. histolytica</i>	1	1.3
<i>Trichuris</i> + <i>Giardia</i>	1	1.3
<b>Total with two parasites</b>	14	18.2
<b>Three Parasites</b>		
<i>Ascaris</i> + <i>Trichuris</i> + Hookworm	1	1.3
<i>Ascaris</i> + <i>Trichuris</i> + <i>E.coli</i>	1	1.3
<i>Ascaris</i> + <i>Trichuris</i> + <i>Blastocystis</i>	2	2.6
<i>Trichuris</i> + <i>Giardia</i> + <i>Blastocystis</i>	1	1.3
<b>Total with 3 parasites</b>	5	6.5
<b>Four Parasites</b>		
<i>Ascaris</i> + <i>Trichuris</i> + Hookworm + <i>E.coli</i>	1	1.3
<b>Total with four parasite</b>	1	1.3

Table 4. Review of intestinal parasitic infections in Orang Asli population from 1972- 2011

Reference	Study area	No. exam	% infected	Parasitic infections in %						
				As	TTO	HW	<i>E. hist</i>	<i>E. coli</i>	<i>Giardia</i>	<i>Crypto</i>
Dunn, 1972	Pahang/ Johor	1273	91.3	38.1	55.4	72.8	3.2	28.2	11.1	0
Dissanaike, 1977	Gombak	126	99.2	47.6	80.9	95.2	8.7	21.4	4.8	0
Karim <i>et al.</i> , 1995	Perak	59	61.5	18.6	35.6	13.6	40.7	3.4	11.9	-
Norhyati <i>et al.</i> , 1997	Perak			63.0	92.0	29.0	-	-	-	-
Rahmah <i>et al.</i> , 1997	Kelantan	84	79.8	59.5	41.7	6.0	-	-	-	-
Ghani <i>et al.</i> , 2002	Pangsoon	159	55.3	33.3	55.3	44.7	-	-	-	-
Noor Aini <i>et al.</i> , 2004	Selangor	281		19.0	26.0	3.0	-	-	-	-
Hakim <i>et al.</i> , 2007	Cameron Highland	74	59.5	25.7	31.1	8.1	9.4		17.6	2.7
Noor Azian, 2007	Pahang	130	72.3	-	-	-	18.5	26.2	29.2	-
Al-Mekhlafi <i>et al.</i> , 2008	Pahang	120	65.8	97.8	10.8	-	-	-	-	-
Sinniah <i>et al.</i> , 2010	Perak	75	77.3	20.0	66.7	33.3	5.3	2.7	4.0	-
Current study	Perak	77	50.6	26.9	39.0	3.9	1.3	5.2	5.2	1.3

Dunn (1972) and Rahmah *et al.* (1997) respectively to 55.3%; 59.5% and 50.6% as reported by recent studies of Ghani *et al.* (1997), Hakim *et al.* (2007) and this current study respectively.

The government has built resettlement posts where proper houses with basic amenities such as water, latrines, electricity and roads has resulted in the decrease of blood parasites such as malaria and filariasis. Despite this, many of the intestinal parasites which were neglected for too long due to funding and human resources are still prevalent in several rural areas of the country. Water borne diseases has also decreased over the past decade. In recent studies (Karim *et al.*, 1995; Nor Aini *et al.*, 2004; Hakim *et al.*, 2007; Sinniah *et al.*, 2010) reported a prevalence of *A. lumbricoides* less than 30% except for Norhyati *et al.* (1997) and Al-Mekhalfi *et al.* (2008), who reported a high prevalence of 63.0% and 97.8% infection rate respectively. *Trichuris trichiura* was found to be more or less similar (39%) in prevalence compared to other studies [Karim *et al.*, 1995 (35.6%); Nor Aini *et al.*, 2004 (26%); Hakim *et al.*, 2007 (31.1%); Mekhalfi *et al.*, 2008 (10.8%)]. Higher prevalence rate for *T. trichiura* has been reported by Dissanaiké *et al.* (1997) (80.9%), Norhyati *et al.* (1997) (92.0%) and Sinniah *et al.* (2010) (66.7%). With regards to hookworm infection the prevalence rate has decreased from as high as 72.8% (Dunn 1972) and 95.2% (Dissanaiké *et al.*, 1977) to as low as 10.8% (Al-Mekhalfi *et al.*, 2008); 8.1% (Hakim *et al.*, 2007) and 3.1% (Sinniah *et al.*, current study). The decrease in hookworm is probably due to higher number of Orang Aslis wearing shoes. It must be stated that the high prevalence rate for soil transmitted helminths namely *A. lumbricoides*, *T. trichiura* and hookworm exists not because of any racial predisposition or susceptibility to infection but is an indication of the conditions of insanitary environment, poor living conditions, neglect in control work as well as lack of health education associated with poverty, lack of clean water and personal hygiene. The Orang Aslis hardly use soap or wash their hands before eating. The use of latrine is not common; instead they defecate

in the open field or behind bushes near rivers. Most of the Orang Aslis live in environments where environmental sanitation and general conditions of living are poor and both transmission and re-infection with soil-transmitted helminthiasis occur continuously. It has been reported that high prevalence rates persists after infancy through to adulthood, heavy worm burdens are found mainly in children (Elkins *et al.*, 1986; Bundy *et al.*, 1987). In this study, the prevalence rate of intestinal parasites increased in the 1-12 year age group (69.6%) to reach the peak in the 13-20 year age group (90.9%) and decreased after 21 to 40 year age group (23.4%) probably reflecting better health care and that the prevalence also significantly decreased with age.

Examination of soil around the houses did not show any human parasites although animal and plant nematodes were recovered from the samples. This indicates that the source of human infection is not around their houses but from some other sources. The Orang Aslis have many dogs and it is known that these dogs will eat the faeces and thereby spread the eggs to a different location. The source of infection is probably away from their houses. As for nail clippings no human parasites were detected. Only spores and yeast were recovered indicating that the source of infection is probably through food and water. Other studies (Kobayashi, 1954; Ismid *et al.*, 1980; Muttalib *et al.*, 1983) have demonstrated parasitic ova in the soil but none was found in this study.

Over the past decade the prevalence of intestinal protozoan parasites has fluctuated drastically with different studies. Karim *et al.* (1995) reported a prevalence of 40.7% for *E. histolytica* and 11.9% *G. lamblia* infection; Noor Azian *et al.* (2007) reported a prevalence of 18.5% for *E. histolytica* and 29.2% for *G. lamblia*. Hakim *et al.* (2007) in their study found a prevalence of 9.4% for *E. histolytica* and 17.6% *Giardia* infection whereas Sinniah *et al.* (2010) reported only 5.3% for *E. histolytica* and 4% *G. lamblia* infection. The current study found only 1.3% infection with *E. histolytica* and 5.2% with *G. lamblia* infection. The decrease in the number of cases of intestinal protozoan

infection in our study and that of Sinniah *et al.* (2010) suggests that clean water supply to the Orang Asli communities has helped in decreasing the number of cases of water borne infections. Although the prevalence of intestinal parasites are high the morbidity caused by these parasites are low and as such it is considered a low priority by the health providers and so the prevalence and intensity of the infection continues with little sign of being eradicated soon. The intestinal parasites seem to have remarkable ability to maintain stable populations in their host. In addition the Orang Aslis are a highly mobile group who travel widely in and out of the forest, drink water from rivers and stream and eat fruits and tubers raw thus prone to get infected with intestinal parasites. Great efforts have been carried out to combat the menace of parasitic diseases which resulted in limited achievements. The government's efforts of building hostels for schoolchildren have resulted in Orang Aslis completing their studies in Universities and colleges. In addition the government has provided them with their own Hospital in Gombak, Selangor together with many health centers near their villages. (Jabatan Hal Ehwal Orang Asli, 2004). Although the government is trying hard to provide the Orang Asli communities with better housing and health, they do not seem to appreciate or fail to understand the importance of personal hygiene and proper usage of toilet. Majority of the Orang Aslis especially the older ones in the community ignore the importance of environmental sanitation and clean practices that will help to prevent infection.

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