SHORT COMMUNICATION

Amoebiasis amongst the Orang Asli (aborigine) School Children at Sungai Raba Village, Gerik, Perak, Malaysia

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ABSTRACT

Introduction: **Amoebiasis is the infection by *Entamoeba histolytica* which is widespread worldwide and higher prevalence is usually seen among the indigenous under priviledged people living in the tropics and subtropics.**

Objectives: **This study was conducted to investigate the prevalence of amoebiasis among the Orang Asli (aboriginal) school children at Sungai Raba Village, Gerik, in the state of Perak, Malaysia.**

Materials & methods: **Cross-sectional study was carried out among 139 volunteered Orang Asli school children aged between 6 to 13 years old comprising 66 boys and 73 girls. The stool specimens were collected and screened for the parasite by the direct fecal smear method followed by formalin ether concentration technique.**

Results: **The overall prevalence of amoebiasis in this population was 14.4% (20/139). Males had a slightly higher prevalence rate of 15.1% (10/66) compared to females at 13.7% (10/73). The highest infection rate at 21.3% was observed in school children aged between 10 ― 11 years. Generally, the formalin ether concentration technique had shown a higher percentage of detection (90%) compared to direct fecal smear (50%).**

Conclusion: **Amoebiasis among the aboriginal school children at Sungai Raba Village, Gerik, still indicates a relatively low health standard of this indigenous community. Promoting awareness of good personal hygiene is definitely one of the measures to control this infection.**

KEY WORDS

amoebiasis, *Entamoeba histolytica*, Orang Asli, aborigines, school children, Malaysia

INTRODUCTION

Infection by intestinal protozoan *Entamoeba histolytica* is common and frequently associated with diarrhoeal disease worldwide, especially in the tropics. *Entamoeba histolytica* is usually spread by the fecal ― oral route in which water is a major vehicle of transmission. One of the common ways human get infected with *Entamoeba histolytica* is through consumption of contaminated water and food items such as fruits and vegetables, with the cyst stage of the amoeba. The high prevalence of amoebiasis in developing countries, mostly in rural areas, has been attributed to the substandard level of personal hygiene and poor sanitary infrastructure especially among the aboriginal communities with poor socio-economic background. This is also associated with overcrowded living environment, inadequate access to safe water and the lack of proper sanitation facilities.

In Malaysia, intestinal protozoan infection is endemic among indigenous communities (Orang Asli) in rural areas, especially among children. Although the social infrastructure in Malaysia has, in general, reached a commendable level ever since after independence, there are still local communities, especially the Orang Asli (aborigines) that have not benefited from adequate social infrastructure facilities. One of the many strategies that have been undertaken by the Malaysian government is the resettlement of the aboriginal communities into an area with better access to basic facilities and infrastructure. The aborigines around the Air Banun area, had been resettled into that village as part of the efforts by the Department of Aboriginal (Orang Asli) Affairs Malaysia in developing the administration, infrastructure and economic development among the aboriginal communities. The main source of income for the Orang Asli community at Sungai Raba village is from hunting, farming and also from the forest natural resources. Although the village is situated quite far from the main city, some development can be seen in the form of infrastructure and basic amenities such as water supply, electricity in the form of generator and a primary school equipped with computer and science laboratory.

Thus, this study was carried out to investigate the prevalence of amoebiasis amongst the Orang Asli (aboriginal) school children at Sungai Raba Village, Gerik, in the state of Perak, Malaysia. It was hoped that continued collection and collation of baseline data for intestinal protozoan infections including *Entamoeba histolytica* would be vital for developing effective intervention strategies for improving the health of every group of aboriginal communities in Malaysia.

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Table 1: Prevalence of Amoebiasis according to Gender and Age among Aboriginal school children at Sungai Raba Village

Characteristics	Number of children examined	Number of positive samples	Prevalence (%)
Gender			
Male	66	10	15.1
Female	73	10	13.7
Total	139	20	14.4
Age (years)			
6 – 7	19	3	15.8
8 – 9	45	6	13.3
10 – 11	47	10	21.3
12 – 13	28	1	3.6

MATERIALS AND METHODS

Study area and subjects

Sungai Raba Village is an aboriginal settlement situated few kilometers from Gerik ($5^{0}25^{1}$N $101^{0}08^{1}$W) which is the district capital town of Hulu Perak, Malaysia. After obtaining an informed consent, stool containers were distributed among the 139 volunteered aboriginal school children aged between 6 to 13 years old consisting 66 boys and 73 girls from the RPS Banun Primary School.

Data collection

The stool specimens were collected from the Orang Asli school children aged between 6 to 13 years old. The stool specimens stored in screw-capped containers and immediately transferred to the laboratory for further analysis for the presence of cysts and trophozoites of *Entamoeba histolytica*. The samples were screened by the direct fecal smear method followed by formalin ether concentration technique to enhance the recovery of cysts and trophozoites.

RESULTS

139 stool samples were collected and examined by the direct smear and formalin ether concentration techniques. From the total stool samples, 20 samples (14.4%) were positive for the presence of cysts and or trophozoites. Males had slightly higher prevalence of amoebiasis compared to females (Table 1). The highest infection rate was observed in school children aged between 10-11 years (21.3%) followed by 6-7 years (15.8%), 8-9 years (13.3%) while the lowest infection rate was observed among the school children aged between 12-13 years (3.6%) (Table 1). Based on the two methods used to detect the presence of cysts and trophozoites of *Entamoeba histolytica*, the formalin ether concentration technique had shown a significantly higher percentage of detection rate at 90.0% compared to direct smear at only 50.0% (Table 2).

Table 2: Detection of *Entamoeba histolytica* by Direct Fecal Smear and Formalin Ether Concentration technique

Diagnostic Techniques	*Entamoeba histolytica* N = 20 (%)
Direct Smear	10 (50.0)
Formalin ether concentration technique	18 (90.0)

DISCUSSION

The prevalence of amoebiasis at Sungai Raba Village, Perak indicates that this infection is still significant among the aboriginal school children. The prevalence rate of amoebiasis in this study was 14.4% which was in great contrast to the study done by Shirley & Mohamed Kamel, 2020, at the very same area which recorded a much higher prevalence of 46.6%. The result of our study showed that *E. histolytica* infection is still very much prevalent in our country especially among the aborigines. In our latest studies on amoebiasis at two different sites ie., Pos Titom, Pahang (Mohamed Nur Adli & Mohamed Kamel, 2020a) and Kuala Kubu Bharu, Selangor (Mohamed Nur Adli & Mohamed Kamel, 2020b), the prevalences were also higher at 36% and 51.1% respectively. These infection rates were much higher when compared to previous studies done in the states of Negeri Sembilan, Perak and Pahang by Tengku *et al*. 2012 showing an overall prevalence of 18.6%. Another study done at Pos Senderut, Pahang (Noor Azian *et al*., 2007) also showed a lower infection rate of only 18.5%. A study done at the nearby Pos Lenjang, Pahang (Hartini & Mohamed Kamel, 2009) showed a prevalence of 22.5% while a previous study done at Pos Sungai Rual, Kelantan (Mariam *et al*. 2012) recorded a prevalence of 38.7%.

When comparing between genders, male aboriginal school children seemed to have a slightly higher prevalence of *Entamoeba histolytica* infection (15.1%) compared to female counterpart (13.7%) which was in agreement with the study done by Mohamed Nur Adli & Mohamed Kamel, 2020b. Although males have slightly higher prevalence compared to females, there are lack of evidence to show association between gender and infection rate. Based on the current study, the most probable cause of higher infection rate among the male aboriginal school children could be due to the slight difference in their outdoor activities. Male students seem to be more involved in the outdoor activities and spend more time playing in the river. This might be a contributing factor because the indiscriminate defecation in the bushes along the river by the communities in that area and also outdoor sewage disposal might increase the chances for the river water to be contaminated by the cyst of *Entamoeba histolytica*. This indirectly increases the risk for the aboriginal school children who enjoy playing in the river, to be exposed to the infection.

The highest infection rate is observed in school children aged between 10 - 11 years at 21.3% and is consistent with the findings of our previous study at Pos Titom (Mohamed Nur Adli & Mohamed Kamel, 2020a). Generally, children below 12 years old, have a higher prevalence of infection compared to those above 12 years old. This finding might be attributed to the low level of awareness and poor personal hygiene among the younger school children compared to the older ones. The habit of younger children who are more tempted to drinking unboiled water, might also be one of the main contributing factors, as amoebiasis is a waterborne infection. This clearly shows the lack of health safety awareness among the younger aboriginal school children.

We employed the direct fecal smear and formalin ether concentration techniques to detect the presence of cysts and trophozoites of *E. histolytica* in the stool samples. The recovery of *Entamoeba histolytica* cysts and or trophozoites by using formalin ether concentration technique showed 90% detection rate compared to direct smear which was only able to detect 50% positivity. This shows that the formalin ether concentration technique has more sensitivity in detecting the parasite compared to direct smear. Microscopy detection seems to be still widely used method to detect and diagnose *Entamoeba histolytica* infection because of its cost effectiveness and also reliability. However, to reduce the chances for false negative results, it is best to evaluate 3 stool specimens from each person especially those who are symptomatic. This would increase the sensitivity of the microscopic examination.

In the current study, we do acknowledge some limitations. The findings were based on, only a single stool sample examination rather than three. Due to the intermittent nature of cyst excretion in the feces, the prevalence rate is expected to be higher if three samples were collected and examined. Even though the prevalence of amoebiasis is considered significantly high in this population, we cannot be absolutely sure that the causative agent is really *Entamoeba histolytica*, as *Entamoeba dispar*, is also morphologically indistinguishable from *E. histolytica*. *Entamoeba dispar* is a non pathogenic amoeba that resembles *E. histolytica* morphologically. Furthermore, majority of the children infected, had remained asymptomatic. To confirm the exact species involved, a molecular technique such as the polymerase chain reaction should be employed, which is not feasible in this study. Tengku et al. 2013 had performed a study on amoebiasis in 3 different states in Malaysia employing the single-round PCR technique. He discovered that, out of 500 stool samples, single infection of *E. histolytica*, *Entamoeba dispar*, and *Entamoeba moshkovskii* was identified in 3.2%, 13.4%, and 1%, respectively.

CONCLUSION

Amoebiasis among the aboriginal school children at Sungai Raba Village, Gerik still indicates a relatively low health standard of this indigenous community. Being a water & foodborne disease, promoting awareness of good personal hygiene is definitely one of the measures to control this infection besides the provision of potable water and proper basic sanitation.

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REFERENCES

Hartini Yusof & Mohamed Kamel Abd Ghani. *Entamoeba histolytica* Infection among Aborigines at Pos Lenjang, Pahang. Jurnal Sains Kesihatan Malaysia 2009: 7(1) 2009: 59-64.

Mariam Ahmad, Mohamed Kamel AG, Hartini Yusof, Norhisham Haron, Geishamini Gopal, Hidayatulfathi O. *Entamoeba histolytica* / *E. dispar* infection amongst the Orang Asli children at Pos Sungai Rual, Jeli, Kelantan. Sains Malaysiana 2012: 41: 9; 1095-1098.

Mohamed Nur Adli & Mohamed Kamel AG. Amoebiasis amongst the Orang Asli (aborigine) School Children at Pos Titom, Kuala Lipis, Pahang International Med Journal, 2020a: 423-425.

Mohamed Nur Adli & Mohamed Kamel Abd. Ghani. Amoebiasis amongst the Orang Asli (aborigine) School Children at Kuala Kubu Bharu, Selangor, Malaysia. International Med Journal, 2020b: 27: 2: 141 – 143.

Noor Azian MY, San YM, Gan C, Yusri MY, *et al*. Prevalence of intestinal protozoa in an aborigine community in Pahang, Malaysia. Tropical Biomedicine 2007; 24: 55-62.

Shirley Gee Hoon Tang & Abd Ghani Mohamed Kamel. Intestinal Protozoan Infections of Schoolchildren in an Aboriginal (Orang Asli) Settlement in Perak, Malaysia. International Medical Journal 2020: 27: 1: 31-35.

Tengku S. Anuar, Al-Mekhlafi HM, Mohamed Kamel AG, Osman E, Mohd Yasin A, *et al*. Prevalence and Risk Factors Associated with Entamoeba *histolytica/dispar/moshkovskii*: Infection among Three Orang Asli Ethnic Groups in Malaysia. PLoS ONE 2012: 7(10): e48165. doi:10.1371/journal.pone.0048165.

Tengku S. Anuar, Hesham Al-Mekhlafi, Mohamed Kamel AG, Siti Nor Azreen, Fatmah Md Salleh, Nuraffini Ghazali, Mekadina Bernadus and Norhayati Moktar. Different Clinical Outcomes of *Entamoeba histolytica* in Malaysia: Does Genetic Diversity Exist? Korean J Parasitol 2013: 51: 2: 231-236.