A cross-sectional study was conducted in February 2006 to determine the prevalence of Trichuris trichiura infection among Orang Asli (Aborigine) children at Pos Lenjang, Pahang. A total of 71 faecal samples were collected from the children (40 girls and 31 boys) aged between 1-12 years. The samples were examined for the presence of Trichuris trichiura ova using direct smear and formalin-ether concentration techniques. The result revealed that the overall prevalence of Trichuris trichiura infection was 43.7%. The infection was higher in males (51.6%) compared to females (37.5%), though not statistically significant (p > 0.05). According to age group, the school-aged children had higher prevalence of infection (56.8%) than preschool children (29.4%) (p < 0.05). Low socioeconomic status, large family size, poor environmental sanitation and poor personal hygiene are possible contributing factors that increase the prevalence of infection among the Orang Asli children at Pos Lenjang. In 31 samples positive for Trichuris trichiura, a detection rate of 100% was obtained using formalin-ether concentration, compared to 25.8% with direct smear technique. Thus, it is recommended that both techniques be performed in routine faecal examination for a more accurate diagnosis.

Keywords: Trichuris trichiura, Orang Asli, Malaysia

Trichuris trichiura infection is one of the most common intestinal parasitic infections and it continues to be a public health problem in Malaysia, especially among underprivileged communities (Hesham Al-Mekhlafi et al. 2005; Nor Aini et al. 2007). Orang Asli, the indigenous people of Peninsular Malaysia who live near or in the jungle are among the underprivileged communities due to their poor living condition and lack of access to resources. Previous studies conducted among Orang Asli children in different areas in Malaysia revealed a high prevalence of T. trichiura, ranging from 41.7-98.2% (Rajeswari et al. 1994; Hesham Al-Mekhlafi et al. 2007). Prevalence was also high, ranging from 43.8-83.8% in children from other communities such as rural villages (Thomas et al. 1992), squatter areas (Bundy et al. 1988) and estates (Kan 1989).

The aim of this study was to determine the prevalence of Trichuris trichiura infection among 1-12 years old Orang Asli children at Pos Lenjang, Pahang.

This study was carried out at Pos Lenjang, an aborigine settlement in Pahang, situated about 320 km from Kuala Lumpur. The aborigines are from the Semai tribe and the village comprises of a very small population. Most of the houses were built on stilts, with bamboo and wood. There were basic amenities such as electricity (solar energy) and community standpipes for water supply but no toilets were provided for the families in this village.
Stool containers were distributed to the children aged 1-12 years old in the village and primary school. Each faecal container was labeled with the name, age, sex of the participant and sampling location. The faecal samples were collected on the next morning and brought back to the operation center for parasitological examination. Seventy one children (31 boys and 40 girls) participated in this study. The subjects’ particulars together with the results of the faecal examinations were recorded.

Each faecal sample was subdivided into two parts: one part was unfixed (fresh sample) and the second part was fixed with 10% formalin. Both types of samples were examined for the presence of *Trichuris* eggs. The fresh samples were screened immediately in the field using the direct smear technique. Meanwhile the formalin-fixed samples were examined later using the formalin-ether concentration technique at the Parasitology Laboratory, Universiti Kebangsaan Malaysia.

**PREVALENCE OF TRICHURIS TRICHIURA INFECTION ACCORDING TO GENDER AND AGE AMONG ORANG ASLI CHILDREN**

Seventy one faecal samples were examined by the direct smear and formalin-ether concentration technique, respectively. The overall prevalence of *Trichuris* was 43.7%, with 51.6% males and 37.5% females being infected. According to age groups, about half (56.8%) of the school-aged children were found to be positive for *Trichuris*, whereas for the preschool children, the prevalence of infection was only 29.4% (Table 1).

**TABLE 1. Prevalence of Trichuris trichiura infection according to gender and age among Orang Asli children at Pos Lenjang, Pahang**

<table>
<thead>
<tr>
<th></th>
<th>No. of Examined Samples</th>
<th>No. of Positives Samples</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>31</td>
<td>16</td>
<td>51.6</td>
</tr>
<tr>
<td>Females</td>
<td>40</td>
<td>15</td>
<td>37.5</td>
</tr>
<tr>
<td>Age groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool</td>
<td>34</td>
<td>10</td>
<td>29.4</td>
</tr>
<tr>
<td>(1-6 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schooling</td>
<td>37</td>
<td>21</td>
<td>56.8</td>
</tr>
<tr>
<td>(7-12 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>31</td>
<td>43.7</td>
</tr>
</tbody>
</table>

**DETECTION OF TRICHURIS TRICHIURA INFECTION BY TWO DIFFERENT TECHNIQUES**

Of the 31 positive samples for *T. trichiura*, 31 (100%) were microscopy positive using formalin-ether concentration and 8 (25.8%) were direct smear positive (Table 2).
can be seen based on their poor appearance such as dirty clothes and unclean bodies including their fingernails. They failed to wash their hands thoroughly with soap and water before eating or after defecating. They also consume contaminated food such as unwashed vegetables and fruits.

Due to poverty and logistic factors, this community had to struggle with poor living conditions where basic amenities such as safe drinking water, proper sanitary and garbage disposal were inadequate or absent. There were few stand pipes provided in this Orang Asli village that several families had to share one pipe for their needs and therefore, the existing stand pipes were unable to supply adequate water to all families. Although this community was provided with piped water supply, the river still plays an important role as a source of water for them. They used water from the river for daily activities such as washing clothes, bathing, cooking and drinking. There is probability the residents depend on the river as their major source of water due to insufficient piped water supply. Proper toilet facilities were absent and the children frequently defecate indiscriminately among the bushes near their houses. Some of them also used the rivers and streams for defecation and using river water to clean themselves. As a result, the environment that has been contaminated by infected individual feces may act as one of the sources of infection in the community.

In the current study, we observed that males had a higher prevalence (51.6%) than females (37.5%). This result was consistent with some findings from local studies (Sinniah 1984; Lee et al. 1999). Nevertheless, most of the previous findings proved that there was no significant difference between genders with reference to prevalence for helminth infections, indicating there was no difference in socio-behavioral activity or immune status between males and females (Hesham Al-Mekhlafi et al. 2006).

Trichurisiasis cases were more common among schoolchildren (56.8%) as compared to preschool children (29.4%). Previous observation on urban slum children from Kuala Lumpur demonstrated that the prevalence of Trichuris was increased with age and remained high at the age of 7 and above (Bundy et al. 1988). Norhayati et al. (1997) reported that the prevalence of Trichuris infection was significantly associated with age of Orang Asli children in Dengkil, Selangor. However, their result showed that the prevalence fluctuated and constantly high in all age groups. The possible reasons for the prevalence differences between age groups observed in this study are most likely due to the activities and behavior of the children. The Trichuris infection was common in school-aged children because of their greater outdoor activities compared to the preschool children. They often play on the soil which was polluted with human feces containing Trichuris eggs and put their hands in their mouths without washing them. In addition, the preschool children were more supervised by their parents and spend more time at home which may reduce the chances of exposure to infection.

In this study, each of the faecal samples was examined microscopically for Trichuris eggs using both the direct smear and formalin-ether concentration techniques. Based on the result, formalin-ether concentration was found to be the most sensitive technique for identifying Trichuris eggs in feces with detection rate of 100% compared to 25.8% with direct smear. Previous study has reported that the concentration technique allowed the detection of 98.5% of the total parasites found, whereas direct smears permitted the detection of only 75.8%. It was also reported that 92.3% of helminth ova can be detected by concentration technique while 61.5% was detected by direct smear. The concentration technique was found to significantly improve the detection of intestinal parasites (Wongstitwilairoong et al. 2005). A recent report by Oguoma & Ekwunife (2007) revealed that 5.26% of T. trichuris was detected by concentration technique while 2.11% was detected by direct smear. They suggested that the concentration technique is a very useful technique in diagnosing intestinal helminthes since it depicted a higher percentage of helminthes infection missed by direct smear technique. Hence, it is necessary that both techniques (the direct smear and concentration techniques) should be performed in routine parasitological examination for more accurate diagnosis before any control efforts can be implemented in the affected areas.

This preliminary study indicates that Trichuris infection is still prevalent and therefore this infection becomes one of the major public health problems among the Orang Asli communities especially among children. This calls for a well-planned control measures, including regular deworming of all children using effective broad spectrum anthelmintics and provision of food supplements (including vitamins and minerals) for the children. Meanwhile, improvement of socioeconomic status and environmental sanitation should be the important agenda to be considered in the design of long term STH control strategies in endemic areas. Furthermore, health education programme should be included in control measures to create awareness about health and hygiene in this population.

ACKNOWLEDGEMENT

We would like to thank Mrs. Shafariatul Akmar and Mr. Rahman Law from Parasitology Laboratory, Universiti Kebangsaan Malaysia for their guidance and technical assistance. We also would like to thank Mr. Mohd Yassin from the Jabatan Hal Ehwal Orang Asli, Kuala Lipis Pahang for his information on Orang Asli community in Pos Lenjang, Pahang.
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Hartini Yusof
Fakulti Sains Kesihatan
Universiti Teknologi MARA
Kampus Puncak Alam
42300 Bandar Puncak Alam
Selangor. D. E.

Corresponding author: Mohamed Kamel Abd Ghani
Email address: mkamal@medic.ukm.my
Tel: 603-92897634; Fax: 603-26929032

Received: January 2012
Accepted for publication: February 2012


Mohamed Kamel Abd. Ghani
Program Sains Bioperubatan
Fakulti Sains Kesihatan
Universiti Kebangsaan Malaysia
50300 Jalan Raja Muda Abdul Aziz
Kuala Lumpur, Malaysia

Corresponding author: Mohamed Kamel Abd Ghani
Email address: mkamal@medic.ukm.my
Tel: 603-92897634; Fax: 603-26929032

Received: January 2012
Accepted for publication: February 2012