Giardiasis amongst the Orang Asli (aborigine) School Children at Pos Senderut, Pahang, Malaysia

Mohamed Nur Adli1, Mohamed Kamel Abd. Ghani2

ABSTRACT

Introduction: *Giardia intestinalis* is a protozoan parasite causing giardiasis which is a major diarrheal disease capable of causing malnutrition and stunted growth in children. The parasite spreads via fecal-oral route and is quite prevalent in developing countries and tropical region. The aboriginal community in Malaysia is especially exposed to this parasite due to risk factors such as poor hygiene and lack of clean water supply.

Objective: The cross sectional study aimed to investigate the prevalence of *Giardia intestinalis* infection amongst the Orang Asli (aborigine) school children at Pos Senderut, Pahang, Malaysia.

Materials & methods: In this study, 208 Orang Asli primary school children from standard 1-6 were examined for the presence of *Giardia intestinalis* cyst/trophozoite in fecal samples using direct fecal smear and formalin-ether concentration techniques.

Results: The overall prevalence of giardiasis is 34.6% which is quite high and children who are in the lower primary school have the highest infection rate (38.5%). The formalin-ether concentration technique showed better detection of *Giardia* compared to the direct fecal smear method.

Conclusion: The high prevalence of giardiasis indicates that it is still a significant health issue in Malaysia especially among the children of the aboriginal community. This study recommends increasing the health awareness of the Orang Asli community by organizing health talks especially on the aspect of personal hygiene and sanitation.

KEY WORDS

*giardia intestinalis*, Orang Asli (aborigine), school children, Malaysia

INTRODUCTION

*Giardia intestinalis* is a protozoan parasite causing giardiasis which is a major diarrheal disease. It is one of the most common intestinal protozoan parasites isolated worldwide. The parasite is most commonly found in developing countries and tropical region. Prevalence rates of 15-20% in children younger than 10 years are common. (Caccio & Ryan 2008)1. Even higher prevalence of giardiasis was recorded in west Nepal where it reached a rate of 73.4% (Easow et al. 2005)2. It spreads via faecal-oral route and through contaminated water/food supply which makes children more likely to be infected than adults due to poor hygiene (Mandell et al. 2005)3. One study has shown that the parasite can be found in 80% of raw untreated water supply and 15% in filtered water supply (Robertson et al. 2008)4. Other source of infection includes certain sexual practices such as oral-anal contact (Pakianathan & McMillan, 1999)5. Once infected, patient can remain asymptomatic or develop acute or chronic diarrhoea and in children this may lead to malnutrition and stunted growth. In Malaysia, the aboriginal community is very vulnerable to these infections due to lack of awareness and poor source of clean water. The aim of this study was to evaluate the prevalence of giardiasis amongst the aboriginal school children at Pos Senderut, Pahang.

MATERIALS & METHODS

Subject and Study Area

This cross-sectional study was carried out at Pos Senderut, an aboriginal settlement in the district of Kuala Lipis, Pahang in April 2015 (Fig. 1). It is situated about 300 km from Kuala Lumpur, the capital city of Malaysia. The study was conducted among 208 Orang Asli primary school children from standard 1-6. The predominant characteristic of this community is poor socioeconomic and nutritional status, besides their prominent cultural habit. They depend heavily on river for their domestic needs such as bathing, washing clothes, utensils, animal feeding and even for defecation.

For investigation, a clear explanation about data collection method and objectives was briefed to the headmaster and the school children before consent were taken. The school children were instructed to collect their fresh faecal specimens. They were given sterile, screw capped containers with details of their class and list number on it. Stool samples were examined by the direct faecal smear and followed by formalin-ether sedimentation technique for the presence of *Giardia* cysts and trophozoites.

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RESULT

208 stool samples were collected from the Orang Asli students at Pos Senderut and examined by direct faecal smear and formalin-ether concentration techniques. Of the 208 stool samples, 72 (34.6%) were found to be positive for Giardia cyst/trophozoite as shown in Table 1.

When comparing different age groups, those in the lower primary school (aged 7-9 years) have a higher infection rate (38.5%) compared to those in the higher primary school (31.6%) as shown in Table 2.

The direct fecal smear technique detected 40 cases (55.5%) while the formalin-ether concentration had a better detection with 62 cases (86.1%) as in Table 3.

DISCUSSION

In this study, the prevalence of Giardia intestinalis is 34.6%, and this is quite significantly high when compared to previous studies done in Malaysia. A previous study conducted by Talal et al. 2013 at the same Orang Asli settlement in 2008 showed a lower prevalence at only 21.8%. Giardiasis plays a significant role in causing malnutrition and stunted growth in children. A study done by Al-Mekhlaﬁ et al. 2005 in Selangor, Malaysia, showed a signiﬁcant relationship between Giardia intestinalis infection and protein-energy malnutrition, vitamin A deﬁciency, and iron deﬁciency anaemia. The study also showed that the prevalence of Giardia intestinalis infection among children was around 24.9%. Other previous study also showed a much lower prevalence rate of Giardia intestinalis, and a study by Choy et al. 2014 in seven states of Malaysia showed that the overall prevalence of Giardia intestinalis was only 11.6%. Tengku et al. 2015 did a study in Jelebu, Negeri Sembilan and found a lower rate of infection compared to our study, where the overall prevalence of Giardia intestinalis was 18%. A more recent study done at Pos Titom, Pahang (Mohamed Kamel & Anisah Musa, 2018) showed an infection rate of 23.4%. However a study done at Pos Lenjang, Pahang, showed a higher rate of Giardia infection at 42.7% (Hartini & Mohamad Kamel 2009). The reason why our study showed a higher prevalence rate than most previous studies might be due to geographical location, socio-economic level, and unsafe water resource, or due to the study design.

When comparing different age groups, those in lower primary school, aged 7-9 years, had higher infection rate compared to those in higher primary school. This is consistent with our findings in previous study done in 2008 at the same aboriginal community where children between the age of 6-8 years were the most vulnerable. Study done at Pos Titom (Mohamed Kamel & Anisah Musa, 2018) showed similar rate of infection between those who are 10 years old and above (22.0%) and those who are below 10 years old (24.6%). A retrospective study at Hospital University Sains Malaysia (Zehaida et al. 2008) had shown that the infection rate was higher in those who are less than 12 years old (33%). A possible reason for this according to Balduresson &

<table>
<thead>
<tr>
<th>Protozoa</th>
<th>No. of Student Examined</th>
<th>No. of Positive cases</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giardia intestinalis</td>
<td>208</td>
<td>72</td>
<td>34.6</td>
</tr>
</tbody>
</table>

Table 1. Prevalence of Giardia intestinalis among Orang Asli students at Pos Senderut.

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>No. of student examined</th>
<th>No. of positive cases</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower primary school</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7-9)</td>
<td>91</td>
<td>35</td>
<td>38.5</td>
</tr>
<tr>
<td>Higher primary school</td>
<td></td>
<td>117</td>
<td>31.6</td>
</tr>
<tr>
<td></td>
<td>208</td>
<td>72</td>
<td>34.6</td>
</tr>
</tbody>
</table>

Table 2. Prevalence of Giardia intestinalis according to Age.

<table>
<thead>
<tr>
<th>Diagnostic Techniques</th>
<th>Giardia intestinalis N = 72 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Smear</td>
<td>40(55.5)</td>
</tr>
<tr>
<td>Formalin ether concentration technique</td>
<td>62(86.1)</td>
</tr>
</tbody>
</table>

Karanis 2011 might be attributed to the low level of awareness and poor personal hygiene among the younger school children compared to the older children. The study also revealed that the habits of young children drinking unboiled water might also be one of the main contributing factors for high prevalence of Giardia infection since it is a waterborne disease.

Direct faecal smear is a useful, fast and cheap method for the diagnosis of protozoan and helminth infections. However, detection of parasites, present in small numbers should be performed using formalin-ether concentration technique rather than just direct smear (Suwansaksri et al., 2002). In our study, by only using a single stool specimen from every participant, the direct faecal smear technique detected 55.5% of cases whereas the formalin-ether concentration technique detected significantly more cases (86.1%). More sophisticated tests are available for the detection of Giardia. Other tests such as immunochromatographic and immunofluorescence tests have higher sensitivity and specificity of 90 and 100% respectively. However, these tests are more expensive and not cost effective, especially in developing countries.

Fortunately, all Giardia stool positive children in this study were asymptomatic despite a few stool samples submitted being loose in consistency. This may not be a surprise as the clinical symptoms of giardiasis varied from asymptomatic infection to acute or chronic diarrhoea with abdominal cramps, nausea, vomiting, bloating and malabsorption.

CONCLUSION

The present study showed high prevalence of giardiasis amongst aboriginal school children at Pos Senderut. Different control measures are required in order to combat current levels of infection, including health education pertinent to good personal hygiene and sanitary practices, as well as education aimed at improving general awareness about parasitic infections.

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REFERENCES