

**PREVALENCE OF INTESTINAL PROTOZOAN INFECTIONS AMONG
ORANG ASLI SCHOOLCHILDREN IN POS SENDERUT,
PAHANG, MALAYSIA**

By

**TALAL AL-HARAZI¹, MOHAMED KAMEL ABD GHANI²
And HIDAYATULFATHI OTHMAN²**

Department of Medical Parasitology, Faculty of Medicine Taiz University, Yemen¹ and Department of Biomedical Sciences, Faculty of Allied and Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia² Correspondence: Dr. Talal Al-Harazi, email: alhrzali@yahoo.com

Abstract

The current study determined the prevalence of intestinal protozoan infections among the Orang Asli schoolchildren in Pos Senderut, Pahang, Malaysia. The overall intestinal protozoan infection rate was 85% (261 out of 307). The highest prevalence rates were due to *Entamoeba coli* (24.4%), *Giardia lamblia* (21.8%), *Blastocystis hominis* (21.2%) and *Entamoeba histolytica* (15.0%). The prevalence of *Iodamoeba butschlii* was only 2.9%. Among the positive samples, mixed infection with *B. hominis* and *E. histolytica* was 3.3%, *B. hominis* and *G. lamblia* was 2.9%, *G. lamblia* and *E. histolytica* was 2.0% and triple infections (*B. hominis*, *G. lamblia* and *E. histolytica*) was 1.0 %. The prevalence of the infection was high in all age groups (6-14 years old). Thus, we can conclude that intestinal protozoan infections are still representing a serious public health problem in aboriginal communities, especially among children.

Keywords Protozoan infections, school children, Orang Asli, Malaysia.

Introduction

The intestinal parasites are considered as one of the commonest infections worldwide. Approximately 3.5 billion people are affected and 450 million are ill as a result of these infections, the majority being children (Okyay *et al*, 2004). Numerous protozoa inhabit the gastrointestinal tract of humans; the majority of them are non-pathogenic commensals. The pathogenic protozoa such as *Giardia lamblia*, *Entamoeba histolytica* and *Blastocystis hominis* can cause severe disease under certain

conditions such as severe diarrhea. *G. lamblia* and *E. histolytica* are the most common intestinal protozoa in temperate and tropical countries especially among children (WHO, 2008). Prevalence of blastocystosis in developed countries was varied from 1.5% to 10% while in developing countries is varied from 30% - 50% (Windsor *et al*, 2001; 2003). Noor Hayati *et al*. (1995) in Kuala Lumpur reported 2/196 (1.0%) duodenal aspirates from immunocompetent patients undergoing endoscopy to have *B. hominis* cysts. Among the

hospitalized patients the prevalence of blastocystosis was 0.3% (Noor Hayati *et al*, 2003). Azian *et al*. (2007) found that blastocystosis was 52.30% among aborigines in Pahang. Dhurga *et al*. (2012) reported that *B. hominis* is one of the commonest protozoan parasite worldwide particularly in Malaysia

In Malaysia, the prevalence of giardiasis was 19.2% among Malays from rural areas in Trengganu (Noor Hayati *et al*, 1998a). Also, Noor Hayati *et al*. (1998b) reported 19.4% among Orang Asli people in Perak. The prevalence of amoebiasis varied from between 1-14% (Noor Hayati *et al*, 2003).

In order to update the current status of the intestinal protozoan infections among Orang Asli school children in remote areas in Peninsular Malaysia this study was undertaken in Pos Senderut, Pahang hoping to assist the health policy makers to improve the control measures in order to reduce the prevalence of this infections.

Subjects, Materials and Methods

This cross-sectional study was carried out among 307 Orang Asli school children aged 6-14 years (156 Males and 151 females) in Pos Senderut, in Pahang, Malaysia in August 2008. The school was selected by the academic staff of Department of Biomedical Science in Faculty of Allied Health Sciences, UKM. The total number of enrolled students in this school is 510 pupils. A list of names of all enrolled students was collected from the headmaster's office. All the children were invited to participate in the study.

Poor socioeconomic status is the predominant feature of this community. Most of the houses were bamboo and with piped water as the source of human consumption, but for domestic needs (bathing, washing clothes, utensils and animals' feeding) was from the rivers located adjacent to the villages without adequate or proper sanitation. Most of the children swim, bath and play in the river, which is the preferred sites for defecation.

The stool specimens were collected in 100ml labeled screw-cap plastic containers and immediately transported to the laboratory. Samples were concentrated by formalin ethyl acetate sedimentation technique and examined for protozoa as direct wet mount and in Lugol's iodine solution. A child was positive based on cysts and/or trophozoites detection.

Statistical analysis: Data was done using SPSS 13.0. Mean \pm SD were used to present quantitative data where applicable while proportion was used to present qualitative data. Chi-squared test was used to compare prevalence *s. P*= 0.05 was considered significant.

Ethical consideration: After a clear explanation for the methodology and objectives the headmaster and children were consented verbally to take part in this study. This study was approved by the Research and Ethics Committee, Faculty of Allied Health Sciences, Universiti Kebangsaan, Malaysia.

Results

Three hundred and seven Orang Asli schoolchildren participated voluntarily.

The M±SD age of the subjects was 10±1.8 years. The overall intestinal protozoan infection rate was 85% (261 out of 307). The prevalence of *G. lamblia*, *B. hominis* and *E. histolytica* were 21.8%, 21.2% & 15.0%, respectively (Fig. 1). The prevalence of *E. coli* was 24.4%, and of *I. butschlii* was low (2.9%). Prevalence of mixed infection with *B. hominis* and *E. histolytica* was 3.3%, *B. hominis* and *G. lamblia* was 2.9%, *G. lamblia* and *E. histolytica* was 2.0% and triple infections (*B. hominis*, *G. lamblia* and *E. histolytica*) was only 1.0 % (Fig. 2). Overall, the infection rate of protozoan was more frequent in females than males but the difference

was not statistically significant ($X^2=0.886$; $P=0.347$). The highest infection rate was reported among children aged 6-8 years (67.9%) and 12-14 years (67.1%). Females showed higher giardiasis prevalence than males, but without significant ($X^2=2.792$; $P=0.095$). There was significant difference in the giardiasis prevalence of according to age groups ($X^2=6.950$; $P=0.031$). The females had a significantly higher blastocystosis prevalence than males ($X^2=5.034$; $P=0.025$). But, there was no significant in the prevalence of *E. histolytica* between males and females.

The details are in tables (1 & 2) and figures (1 & 2).

Table 1: Intestinal protozoa among Orang Asli schoolchildren according to sex.

Intestinal protozoa	Male N=156 (%)	Female N=151 (%)	Total N=307 (%)
<i>G. lamblia</i>	28 (17.9)	39 (25.8)	67 (21.8)
<i>E. histolytica</i>	21 (13.5)	24 (15.9)	45 (14.7)
<i>B. hominis</i>	25 (16.0)	40 (26.5)*	65 (21.2)
<i>E. coli</i>	37 (23.7)	38 (25.2)	75 (24.4)
<i>I. butschlii</i>	5 (3.2)	4 (2.6)	9 (2.9)
Total	116 (37.8)	145 (47.2)	261 (85)

* Significant difference ($P<0.05$)

Table 2: Intestinal protozoa % among Orang Asli schoolchildren according to age groups

Age group	<i>G. lamblia</i>	<i>E. histolytica</i>	<i>B. hominis</i>	<i>E. coli</i>	<i>I. butschlii</i>
6 - 8	32.1*	23.5	24.7	23.5	0
9 - 11	17.4	11.8	16.0	23.6	3.5
12- 14	19.5	11.0	26.8	26.8	4.9
Total	21.8	14.7	21.2	24.4	2.9

* Significant difference ($P<0.05$)

Discussion

The intestinal protozoa are widely distributed around the world, and infections usually vary according to immunity, region and age. An increase in the incidence of these infections is evident in low socio-economic communities with poor sanitation (Dinleyici *et al*,

2003). *G. duodenalis*, *E. histolytica* and *B. hominis* infections are endemic in most tropical and subtropical countries. *G. duodenalis* is a well-known predictor of impaired growth of children in rural areas of developing countries (Gendrel *et al*, 2003; Al-Mekhlafi *et al*, 2005). *E. histolytica* was respon-

sible for millions of cases of dysentery and liver abscess each year (WHO, 1997). Epidemiological studies in different countries showed that socioeconomic situation has an important role in the prevalence of intestinal protozoa.

The poor sanitary and environmental conditions are relevant in the propagations of these infectious agents (Tellez *et al.*, 1997; Phiri *et al.*, 2000).

The prevalence of intestinal parasites in Malaysia is common especially among aborigines who live in remote areas near rivers or streams water which contaminated with ova or cyst passed out with feces to the water (Noor Hayati *et al.*, 2003). This current study reported a high prevalence (85%) of *G. lamblia* (21.8%), *B. hominis* (21.2%), *E. histolytica* (15%) and *I. butschlii* (2.9%) and this indicates a high exposure of these children to protozoan infections. This result agreed with previous studies conducted in other states in Malaysia (Noor Hayati *et al.*, 1998; Al-Mekhlafi *et al.*, 2005; Mahdy *et al.*, 2008). But, Noor Azian *et al.* (2007) in Pahang among 130 individuals 94 (72.3%) were positive with at least one intestinal protozoa. These were *B. hominis*, *G. lamblia*, *E. histolytica*, *E. coli*, *E. hartmani*, *E. polecki*, *Endolimax nana*, *I. butschlii* and *Chilomastix mesnili* were detected. *B. hominis* were (52.3%), followed by *G. lamblia* (29.2%), *E. coli* (26.2%) and *E. histolytica* (18.5%). Mixed infection with *E. histolytica* and *G. lamblia* was 3.8%, *E. histolytica* and *B. hominis* was 15.4%, *G. lamblia* and *B. hominis* was 17.7%. Triple infection of *E. histolytica*, *G. lamblia* and *B. hominis* was

3.1%. Infection was more prevalent in children below 10 years (45.4%) and lowest in ages above 60 years (3.8%). The present prevalence of blastocystosis was much higher than previous studies and this could be due to the exposure to sources of infections in the Orang Asli's communities. Suresh *et al.* (2005) found that *Blastocystis* cysts in 47/123 of sewage treatment workers (37 Scottish, 17 Malaysian). Vennilla *et al.* (1999) found blastocystosis (5.6%) among symptomatic patients in Kuala Lumpur, Malaysia. In comparison with other countries, Suresh and Smith (2004) found that almost 4.0% of patients with gastrointestinal symptoms from Scotland were infected with *B. hominis* and 20.5% of the cases excreted cysts.

Water-borne parasites are the most frequent mechanism of spread and person-to-person transmission can occur (Adarosy *et al.*, 2013). Water supply is an important risk factor for borne parasitosis from municipal water supplies contaminated with human waste (Enander *et al.*, 2012). Contamination of drinking water with *Giardia* has been increasingly recognized over the past 10 years as a cause of water-borne diseases in humans (Xiao *et al.*, 2013). Furthermore, *Cryptosporidium* oocysts and *G. lamblia* cysts were found in water sources (El Shazly *et al.*, 2007) and even in 10% of samples of swimming pools (Abd El-Salam, 2012). Practicing good hygiene (e.g., wash hands with soap and water before eating) and avoiding using contaminated water/food are the main preventive measures to prevent common intestinal

protozoa (Alum *et al.*, 2010).

The present study found no significant differences in protozoan infections between sexes and this could be due to the similar daily routine chores of both of them. This agreed with Nimri (1994) in Jordan, Okyay *et al.* (2004) in Turkey, Kassem *et al.* (2007) in Libya, Fathy (2011) in Egypt, and Mohammad and Koshak (2011) in Saudi Arabia. In contrast, *B. hominis* was significantly higher in males than females. In present study, all age groups were infected by one or more protozoa. This result agreed with previous studies in Malaysia (Al-Mekhlafi *et al.*, 2005). Giardiasis was more prevalent among young children aged 6-8 years, which agreed with Noor Hayati *et al.* (1998). The younger age group was shown to be at higher risk to be infected with intestinal protozoa than the older age group; this could be due to the lack of health education among mothers in looking after their children. This could be also due to immune-modulating factors as the immunity of young children is lower than the older children.

During the study visits the personal hygiene of aborigine population in this community was very poor. Children tend to have peculiar habits such as playing outside barefooted and not washing hands before and after eating, and consumes raw fruits and sugar cane without washing. Beside these factors, lack of proper sanitation has an important role in the transmission of protozoan infections in the community.

Conclusion

The outcome results emphasized that intestinal protozoan infections are still

a major public health challenge that needs to be addressed to decrease its burden on the health care system and the welfare. The high prevalence was attributable to poor environmental management, poor personal hygiene and lack of health education. The public education, health promotion, improving sanitation conditions of underdeveloped areas/communities, community involvement and supporting evidence-based practice/programs are the keys to success in preventing the spread of intestinal protozoan infections in Malaysia. In this regard, the present findings are a basis to develop strategies and preventive programs targeting groups at greater risk of intestinal protozoan infections.

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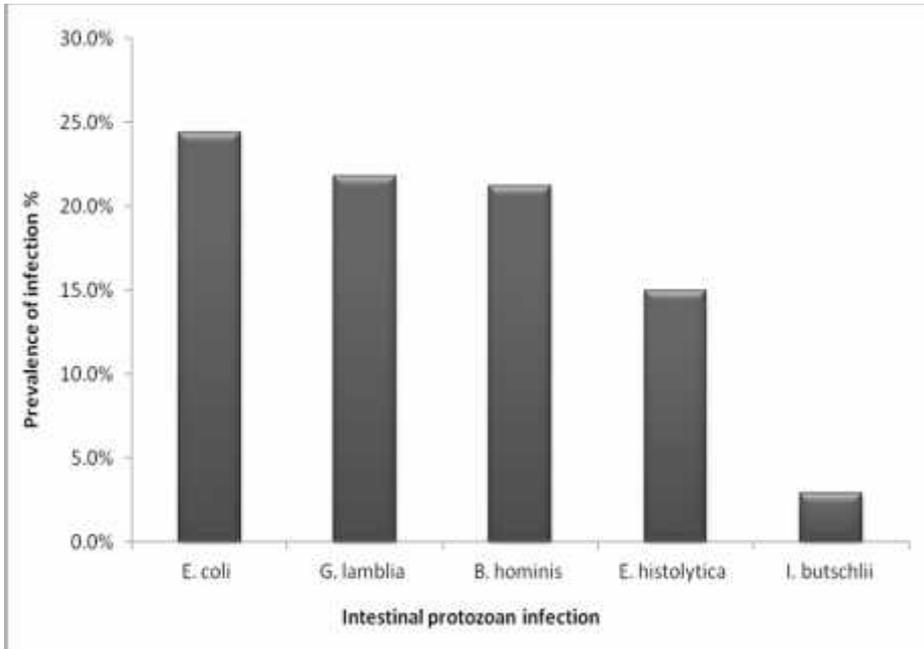


Figure 1: Prevalence of intestinal protozoan infections among Orang Asli schoolchildren

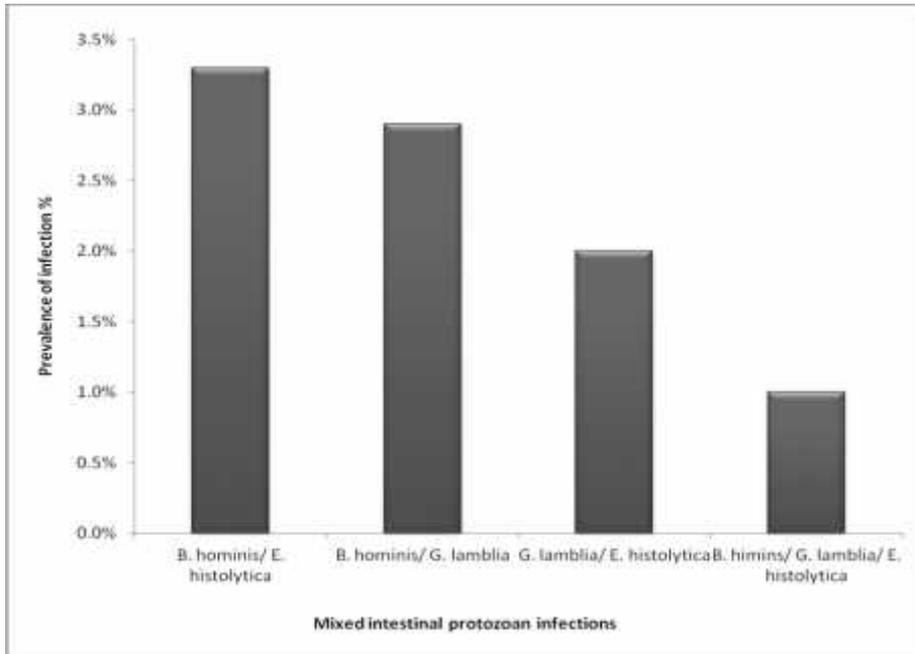


Figure 2: Prevalence of mixed intestinal protozoan infections among Orang Asli schoolchildren