

PREVALENCE AND SOME RISK FACTORS OF *GIARDIA DUODENALIS* INFECTION IN A RURAL COMMUNITY IN MALAYSIA

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Abstract. A study on prevalence and risk factors of *Giardia duodenalis* infection was conducted in rural communities of Malaysia. A total of 917 individuals between 2-70 years old (431 males and 486 females), participated in this study. The overall prevalence of *G. duodenalis* infection was 19.2%. The prevalence was significantly different between different age groups, but not genders. Our study indicated that age ≤ 12 years old and the presence of family members infected with *G. duodenalis* were the risk factors of infection. Person-to-person contact within the family members was the possible mode of transmission. Health education on personal hygiene, together with the treatment of the infected people, may help in reducing and controlling this infection in these communities.

INTRODUCTION

Giardia duodenalis is the most common protozoan infection of the intestinal tract and is found world wide throughout temperate and tropical countries (Adam, 1991). In Malaysia, the prevalence of *G. duodenalis* varies between 2% and 25%, depending on areas studied and methods used in the detection of the protozoa (Bisseru and Aziz, 1970; Dunn, 1972; Dissanaikie *et al*, 1977; Sinniah *et al*, 1978; 1978; Hamimah *et al*, 1982; Sinniah, 1984; Che Ghani *et al*, 1987; Rajeswari *et al*, 1994; Shekar *et al*, 1996). Infection with *G. duodenalis* may be acquired through person-to-person transmission or the ingestion of fecally contaminated water or food (Casemore, 1990). The infection occurs sporadically. However many outbreaks of giardiasis have been reported all over the world (Brodsky *et al*, 1974; Show *et al*, 1977; Wright *et al*, 1977; Meyers *et al*, 1977; Keystone *et al*, 1978; Kirner *et al*, 1978; Thacker *et al*, 1979; Osterholm *et al*, 1981; Hopkins *et al*, 1985; Peterson *et al*, 1988; White *et al*, 1989; Porter *et al*, 1990; Quick *et al*, 1992; Mintz *et al*, 1993). Infection is more common in children, particularly in the 6-10 years old and in underprivileged communities in the rural and urban

areas. Study has identified several risk factors, such as using unsafe water for drinking, family member in a day care program, family member with diagnosed giardiasis and history of travelling out of the country (Chute *et al*, 1987).

We conducted a community-based study to determine the prevalence of *G. duodenalis* and to elucidate some of risk factors of getting this infection in rural communities.

MATERIALS AND METHODS

This study was conducted in a few Malay villages around Kuala Berang, Terengganu, about 450 km from Kuala Lumpur. Nine hundred and seventeen subjects between 2-70 years old (431 males and 486 females) were included in this study. Fecal samples were collected in fecal containers. about 0.5gm of fecal sample from each study subject was fixed in 10% formalin and polyvinyl alcohol. Fecal samples fixed with 10% formalin were examined for the presence of *G. duodenalis* antigen using the double antibody sandwich ELISA technic (LMD LAB, 1995). Fecal samples fixed with polyvinyl alcohol were stained with trichrome for microscopic detection of *G. duodenalis*. Biodata and socioeconomic data of the subjects were obtained using a questionnaire. Data was analyzed using EpiInfo (EpiInfo, version 6.2, 1994) and SPSS for windows (SPSS, Release 6, 1993).

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RESULTS

The prevalence and distribution of *G. duodenalis* infection are shown in Table 1. Of the 917 subjects studied 19.2% (176) were positive for *G. duodenalis*. Overall, females had a higher prevalence of *G. duodenalis* infection than males. However the difference was not statistically significant. The prevalence of *G. duodenalis* infection according to age groups varied with the highest prevalence in 7-12 years old age-group (23.4%). The prevalence

decreased with age. The differences were statistically significant ($X^2 = 13.88$, $p = 0.0030$).

The results univariate analysis for *G. duodenalis* infection are shown in Table 2. Significant risk factors detected were age ≤ 12 years old, household income \leq RM200.0 and other family members infected with *G. duodenalis*. Logistic regression analysis confirmed that age ≤ 12 years old and other family members infected with *G. duodenalis* were the risk factors of *G. duodenalis* infection (Table 3).

Table 1

Prevalence of *Giardia duodenalis* according to age and gender.

Age/gender	No. examined	No. infected	Prevalence (%)
Age (years)			
2-6	211	46	21.8
7-12	316	74	23.4
13-20	96	20	20.8
≥ 21	294	36	12.2
Gender			
Male	431	73	16.9
Female	486	103	21.2
Total	917	176	19.2

Table 2

Results of univariate analysis of risk factors for *Giardia duodenalis*.

Variables	Prevalence (%)		Odds ratio (95% CI)	p-value
	Non-infected	Infected		
Age ≤ 12 years	54.9	68.2	1.76 (1.23, 2.54)	0.0014
Male	48.3	41.5	0.76 (0.53, 1.07)	0.1024
Household income \leq RM200.0	33.7	28.6	1.49 (1.05, 2.11)	0.0186
Non-educated mother	34.2	28.6	0.77 (0.49, 1.18)	0.2097
Non-educated father	26.1	22.9	0.84 (0.52, 1.33)	0.4320
Non-usage of pipe-water	34.7	29.0	0.77 (0.53, 1.11)	0.1497
Non-usage of toilets	7.2	7.4	1.04 (0.51, 1.98)	0.9141
Other family members infected with <i>G. duodenalis</i>	34.8	67.0	3.81 (2.55, 5.72)	0.0000

Table 3

Results of logistic regression (stepwise forward) analysis of risk factors for *Giardia duodenalis*.

Variables p	Parameter estimate (B)	Standard error of estimate	Odds ratio	
Constant	-1.7889	0.2003	-	0.0000
Other family members infected with <i>G. duodenalis</i>	1.3471	0.1989	3.8462	0.0000
Age ≤ 12 years	0.7142	0.2040	2.0425	0.0005

DISCUSSION

In comparison our study indicated that the prevalence of *G. duodenalis* infection in rural communities was higher than that reported in other studies, conducted in an island (Nawalinski *et al*, 1978), urban shum and rural villages (Che Ghani *et al*, 1987; Shekar *et al*, 1996) and Orang Asli communities (Dissanaike *et al*, 1977). It is possible that we detected more *G. duodenalis* infection in this study, by the examination of preserved stool specimens for the presence of the protozoa (trichrome staining) and the detection of its antigen. The results of sensitivity and specificity of antigen detection using the microwell ELISA compared to trichrome staining are discussed in another paper.

In our study, the prevalence of *G. duodenalis* infection was high in children ≤ 12 years old. Statistical analysis confirmed that children younger than 12 years old were more susceptible to *G. duodenalis* infection. This finding agreed with another study that compared the susceptibility to the infection between children of different age groups (Nimri, 1994). Several possible reasons could be attributed to the lesser degree of susceptibility in older children, such as their daily activities and their ability to look after their personal hygiene. A better immune status could also be a protective factor that reduced the susceptibility rate among older children.

Our study also showed individuals with family members infected with *G. duodenalis* were 3.8 times more likely of being infected when compared to individuals without this risk factor. This finding indicated that infections within family and person-to-person contact within family members were the

possible mode of transmission in these communities. The importance of these factors in the transmission and distribution of *G. duodenalis* infection has been reported before (Chute *et al*, 1987). Although previous studies had shown that *G. duodenalis* infections were more common in areas where safe water supply and basic sanitation were not available (Bisseru and Aziz, 1977; Lai, 1992), our investigation indicated non-usage of pipe-water and toilets was not the risk factors in our study sites. Our study identified the life-styles or daily activities related to age, and the presence of other infected family members were the risk factors of *G. duodenalis* infection. Person-to-person contact within the family members was the possible mode of transmission. Health education on personal hygiene and providing treatment to the infected people may reduce and control this infection infection in these communities.

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