

Toxoplasmosis among Indonesian Migrant Workers in Malaysia

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ABSTRACT

Objective: Primary toxoplasmosis is usually subclinical, but in severely immuno-compromised patients, it may be life-threatening. For this reason, it is important to monitor situations related to non-noticeable diseases among foreign arrivals in the country. In this study, we aimed to survey toxoplasmosis among migrants from Indonesia to Malaysia. **Methods:** In a prospective observational study, a serological evaluation on toxoplasmosis among 336 Indonesian migrants was conducted in a plantation and a detention camp. A study-subject information sheet was used to obtain demographic information and venous blood samples for the serological study to determine *Toxoplasma gondii* IgG and IgM antibodies. The control group was composed of 198 local Malaysians working in the same plantation and detention camp. **Results:** The age of study participants ranged from 19-45 years (geometric mean 29.9). One hundred and thirty-eight legal Indonesian workers (42%) were found positive for IgG and twenty workers (6%) were positive for IgM. The high prevalence rate of 54.4% among the illegal Indonesian migrants is significantly higher than that for local Malaysian workers and detainees from other countries ($p < 0.05$). No significant difference in the prevalence rate was noted among the migrants or local workers when they were grouped according to agricultural and non-agricultural occupations ($p > 0.05$). **Conclusion:** The continuous introduction of these infections may, in the long term, influence the epidemiology and further compromise efforts in control and prevention. A routine screening for toxoplasmosis may be indicated for sub-groups of migrants in this country.

Key words: Imported infections, migrant workers seroprevalence, toxoplasmosis

INTRODUCTION

Toxoplasma gondii is a protozoan parasite that is endemic worldwide and is a major opportunistic pathogen in immuno-compromised hosts. Infection is mainly acquired by ingestion of food, water or soil that is contaminated with oocysts shed by cats, or by eating undercooked or raw meat containing tissue cysts.^[1] Primary infection is usually sub-clinical, but in severely immuno-compromised patients, it may be life-threatening. Most primary infections subsequently phase into chronic infections in which the parasite persists in tissue cysts, mainly in the brain, retina, skeletal and cardiac muscles.^[2] These chronic infections probably persist indefinitely throughout life and may remain undiagnosed until or unless it is reactivated as a result of severe immune suppression.^[3]

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For the diagnosis of *T. gondii* infection, detection of the organism itself is confirmative but very difficult. Thus, most clinical laboratories use serological tests to detect antibodies against *T. gondii* such as the latex agglutination (LA) test, ELISA and indirect fluorescent antibody test because of its high specificity and sensitivity.^[4]

Seroprevalence in different populations may vary according to different environments, social customs and habits.^[5,6] Analysis of worldwide reports indicate that, on average, about 38.5% humans, 32.9% cats and 24.2% goats are seropositive for toxoplasmosis.^[7,8,9]

The aim of this study was to survey toxoplasmosis among Indonesian migrants to Malaysia. The arrival of migrant workers in Malaysia since the 1980s has raised concerns that some formerly unknown diseases may be inadvertently brought into the country.^[10,11] Although most of the identified infections are also endemic in the country, the continuous introduction of these infections may, in the long term, influence the epidemiology and further compromise efforts in control and prevention.

METHODS

The nature of the study was prospective and observational. All subjects who were involved in this study gave their consent. An isolated oil palm plantation within a rural setting and a detention camp located at the fringe of rubber plantations and orchards were selected as the sites for undertaking this study. The survey involved 501 male migrants from different Asian countries. Of this figure, there were 336 Indonesian workers (178 legal workers and 158 illegal). For comparison, the study included 198 local Malaysian male workers who were living and working in the plantation where the survey was conducted and also Malaysian police and immigration personnel who were serving in the detention camp.

Data Collection and Analysis

The seroprevalence study was conducted on sera from a single collection of blood samples. After separation, the serum was heat-inactivated at 56° C for 30 minutes, followed by centrifugation for clarification. The samples were initially screened for *Toxoplasma* IgG antibody by the immuno-fluorescent antibody test (IFAT). The significant titre was defined as 1:64 and above. Positive samples were further titrated at two-fold dilutions to determine end-point values. All serum samples were also tested for IgM antibody by captured enzyme-linked immunosorbant assay (ELISA). The samples were diluted to 1:100. The absorbance of the wells was read within 15 minutes from the end of the assay at 450 nm against the reference wavelength of 620 nm.

Demographic information was gathered using a study-subject information sheet. The variables included age, country of origin, status of entry and occupation. Institutional permission was obtained before starting our study. Statistical analyses were conducted by using SPSS version 10.0 for Windows 2004. Chi-square test for significance at 95% confidence level and a *p*-value of less than 0.05 was considered statistically significant.

RESULTS

The overall distribution of *Toxoplasma* IgG and IgM antibodies among the migrants who come from different Asian countries (Indian subcontinent, Indonesia, Bangladesh, Thailand

Table 1. Overall distribution of *Toxoplasma* IgG and IgM antibodies among migrant and local subjects in the host country

Study subjects	Sample size	IgG-positive Number (%)	IgM-positive Number (%)
Migrants	501	171 (34.1%)	26 (5.2%)
Locals	198	89 (44.9%)	17 (8.6%)
<i>P</i> -value		0.009	0.17
95% CI		-0.240 to 0.080	-0.069 to 0.009

Table 2. Comparison of *Toxoplasma* IgG and IgM antibodies between legal Indonesians and other workers

Country of origin	Sample size	IgG-positive Number (%)	IgM-positive Number (%)
Legal Indonesians	178	52 (29.2%)	7 (3.9%)
Local Workers	198	89 (44.9%)	17 (8.6%)
<i>P</i> -value		0.0001	0.08
95% CI		-0.309 to 0.111	-0.088 to 0.008
Legal Indonesians	178	52 (29.2%)	7 (3.9%)
Other detainees	165	33(20.0%)	6 (3.6%)
<i>P</i> -value		0.045	0.08
95% CI		-0.001 to 0.181	-0.037 to 0.045

and China) was compared to that of the local residents. IgG prevalence among local residents was significantly ($p=0.009$) higher than that for migrant workers (Table 1).

Two hundred and one workers had been issued permits by the relevant government authorities to work in the plantation. Besides the legal migrant workers, the study involved 300 foreigners who had entered the country without legal papers. In this article the author will only present results of study subjects from Indonesia. Results for other migrant sub-groups are presented in other articles.^[12,13]

The distribution of antibodies among the migrant subjects was grouped according to their status of entry into the host country. Analysis of IgG positive rate of illegal Indonesian workers showed significant differences when compared to local workers and other detainees. The IgG positive rate of legal Indonesian workers was significantly high when compared to other detainees, but low compared to local workers (Tables 2 and 3).

Statistical analysis did not establish significant difference in infection rates between those who worked in the field and those who engaged in non-agricultural activities (Table 4).

Table 3. Comparison of *Toxoplasma* IgG and IgM antibodies between illegal Indonesians and other workers

Country of origin	Sample size	IgG-positive Number (%)	IgM-positive Number (%)
Illegal Indonesians	158	86 (54.4%)	13 (8.2%)
Local Workers	198	89 (44.9%)	17 (8.6%)
<i>P</i> -value		0.049	0.95
95% CI		0.065 to 0.144	-0.062 to 0.054
Illegal Indonesians	158	86 (54.4%)	13 (8.2%)
Other detainees	165	33(20.0%)	6 (3.6%)
<i>P</i> -value		0.001	0.12
95% CI		0.235 to 0.445	-0.005 to 0.097

Table 4. Samples tested positive for toxoplasmosis antibodies in relation to occupations of migrants and local workers

	Agriculture	Non-agriculture	<i>P</i> -value	95% CI
Legal migrants	41 (29.1%)	13 (21.7%)	0.31	-0.054 to 0.214
Illegal migrants	55 (46.2%)	62 (34.3%)	0.06	0.007 to 0.233
Local workers	31 (55.4%)	58 (44.6%)	0.80	-0.163 to 0.263
Total	127 (18.2%)	133 (19.0%)	0.96	-0.104 to 0.084

DISCUSSION

Although in East and Southeast Asia, the seroprevalence rate of *T. gondii* infection is generally lower than that reported for Europe and the Americas,^[14,15] the results of the present study indicate that toxoplasmosis is a common occurrence among local workers and migrants to this country.

From the results of the present study, the overall seroprevalence rate of toxoplasmosis IgG in Malaysian local subjects is 44.9%. As it is not a common practice among locals to consume raw or undercooked meat, it is more than likely that the infection was acquired through the ingestion of mature *T. gondii* oocysts shed by the infected reservoirs. Although there are several reports on the seroprevalence of toxoplasmosis in the local population, it should be cautioned that the locals in the camp as well as those in the chosen plantation are localised groups of study subjects at specific study sites. The majority of the local subjects of the present study were born and bred in the same plantation, isolated from the outside. The continuous transmission and re-exposure to the infection in the closed environment may have contributed to the higher prevalence rate noted in our study. The prevalence

rates deduced from the present survey may not, therefore, be considered as representative of the general population.

The legal migrants had been in the oil palm plantation for an average period of 3.5 years, while the illegal migrants joined the detention camp in the previous 6 months. The highest seroprevalence rate of 54.4% was found among the illegal Indonesians. Toxoplasmosis is one of the most frequently observed food-borne diseases reported in Indonesia.^[16] The difference in the prevalence rates between the two groups of Indonesian migrants (legal and illegal) may be due to their origins from different regions of their home country since prevalence rates vary from region to region in different parts of the Indonesian Archipelago.^[17] As the average duration of stay of the legal workers in the host country was approximately 3.5 years and 6 months for the illegal migrants, the interpretation of this finding is limited by the fact that *Toxoplasma* IgM may last from about 5 months to 5 years.^[18,19] It is uncertain whether these migrant workers may have acquired the infection in the plantation or the infection was acquired in their home countries where the infection is also prevalent. The significantly high titres in some of these workers suggest a recent re-exposure to the infection. This finding substantiates the indication that transmission occurred in the plantation. These observations may hint at the likelihood that toxoplasmosis is being transmitted more frequently in the living quarters where the illegal migrants are being housed than it is transmitted outside.

The nature of occupations is known to pose a risk to infection by *Toxoplasma gondii*. To investigate any possible relationship between the acquisition of toxoplasmosis and occupations, the illegal migrants were grouped according to their occupational activities prior to arriving in the host country or before being detained in the detention camp. A majority of these migrants were involved in farming activities in their home countries, with the rest in non-agricultural activities. As the legal migrant workers had been in the plantation for about 3.5 years on average, their occupations have been defined according to the nature of work at the time when the survey was undertaken. For the purpose of this investigation, occupations that involved agricultural activities included planting, harvesting, weeding and general maintenance of the plots. Non-agricultural occupations essentially included activities in processing and production in the oil palm mills and other general jobs.

The results of the present study do not indicate any significant difference in the prevalence rates between those who are engaged in agricultural and non-agricultural occupations. This may be due to the fact that non-agricultural workers may not be directly involved in agricultural pursuits, but being in the same environment where toxoplasmosis is being actively transmitted would have subjected them to the same risk factors. The authors did not have the opportunity to study non-occupational risk factors. There was a time limitation to do a follow-up study for dietary habits, behavioural risks, environmental conditions, socio-economic strata and standards of hygiene. Future studies of toxoplasmosis in any community should analyse in more detail the other important risk factors that influence the transmission of this disease.

CONCLUSION

The results show that toxoplasmosis is not uncommon among Asian migrant workers and local Malaysians. Statistical analysis did not establish significant differences in the infection rates of those who worked in the field and those who engaged in non-agricultural activities. Our data demonstrates that the highest prevalence rate is among illegal Indonesian migrants. A routine screening for toxoplasmosis may be necessary for sub-groups of migrants in this country.

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