

Short Communication

High *Toxoplasma* Antibody Prevalence among Inhabitants in Jakarta, Indonesia

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(Received March 14, 2003. Accepted June 12, 2003)

SUMMARY: We examined IgG antibody to *Toxoplasma* in sera from 1,693 inhabitants aged 20-85 years in Jakarta. The seroprevalence rate was 70%, without any significant differences between males (71%) and females (69%). Some epidemiological factors contributing to the high prevalences of antibody to *Toxoplasma* in inhabitants of urban areas in Indonesia were discussed.

Toxoplasma gondii is a protozoan parasite distributed throughout the world. Positive antibody prevalences in humans have been reported from most countries. Although *Toxoplasma* infections are asymptomatic in almost all cases, they can cause congenital toxoplasmosis in infants and acute infections in immunosuppressed patients. Infection in the latter has raised recent concerns due to the fact that *Toxoplasma* encephalitis (1) and pneumonia cases (2) have been increasing in patients with acquired immunodeficiency syndrome (AIDS). Southern and Eastern Asia has one of the fastest growing HIV (human immunodeficient virus)/AIDS populations in the world (3). The reported prevalence of antibody to *Toxoplasma* in humans and animals ranged from 2% to 75% in Southeast Asian countries including Bangladesh (4,5), Laos (6), Malaysia (7,8), Singapore (9,10), Thailand (11-15), Vietnam (16), and Indonesia (17-20).

We previously surveyed the prevalence of antibody to *Toxoplasma* in people in several Asian countries located in the temperate (Japan), subtropical (the Philippines), and tropical (Indonesia) zones. Relatively low overall prevalences (below 20%) were found in both urban and rural areas of Japan (21-24). In the Philippines, high prevalences of 30-60% were found in rural settings, whereas urban areas showed low prevalences of around 10% (25). However, in Indonesia, an overall prevalence of 58% was found in the urban area, Surabaya (26), the second largest city in this country. In the present study, we surveyed the prevalence of antibody to *Toxoplasma* in inhabitants of Jakarta, which is the capital of Indonesia.

A total of 1,693 serum samples obtained from private practitioners and hospitals in Jakarta were used in this survey. The ages of the survey subjects ranged from 20 to 85 years, and were grouped at 10-year increments, except for those from subjects over 60, which were grouped in one age group. The age and gender characteristics of the serum samples are shown in Table 1. Mean ages (\pm standard deviation [SD]) were 39.7 (\pm 12.3) years in males, 41.1 (\pm 14.4) years in females, and 40.4 (\pm 13.3) years in the total group, without significant differences between genders ($P > 0.05$ by the Student's *t* test). These serum samples were stored at

Table 1. Age and gender compositions of the present survey population

Age (years)	Number of individuals		Total
	Male	Female	
20-29	215	231	446
30-39	215	168	383
40-49	246	219	465
50-59	94	127	221
≥ 60	66	112	178
Total	836	857	1,693

-20°C until tested.

Levels of antibody to *Toxoplasma* were measured by enzyme-linked immunosorbent assay (ELISA) exactly as previously described (26). In brief, microplates sensitized with *Toxoplasma* antigen were incubated with test sera, alkaline phosphatase-conjugated anti-human IgG, and *p*-nitrophenyl phosphate. Sera showing ELISA values of more than 0.357 were determined to be positive for antibody to *Toxoplasma*. Significance of differences in antibody prevalence was evaluated by the chi-square test with the Yates' correction factor. Significance of differences in mean ELISA value was evaluated by the Student's *t* test.

Figure 1 shows age-dependent prevalence curves obtained using samples from 836 males and 857 females. The overall prevalence was 71% in males and 69% in females. No significant difference was observed between genders ($P > 0.05$). The prevalence of approximately 60% in the samples from subjects in their twenties increased to 80% in subjects in their forties, and this level was maintained until their sixties.

Figure 2 shows the frequency distributions of ELISA values determined for males and females. The maximum value was 2.795 in males and 2.396 in females. The mean ELISA values (\pm SD) of antibody-positive specimens were 0.777 (\pm 0.576) in males and 0.704 (\pm 0.539) in females, without significant differences between genders ($P > 0.05$). The mean ELISA values were also similar among age groups.

Reports on *Toxoplasma* transmission to humans have described two major natural routes (excepting transplacental infection in congenital transmission) (27), as follows: (i) infection by the oocyst through contact with infected cats or exposure to contaminated soil, and (ii) infection by the cyst through ingestion of raw meat. It is generally accepted that

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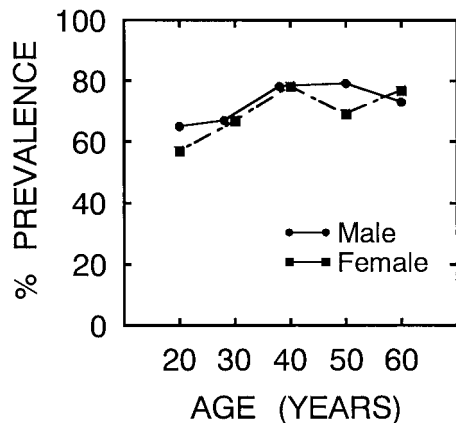


Fig. 1. Age-prevalence curve for antibody to *Toxoplasma* in males (circle) and females (square). Ages were grouped at 10-year increments, with those over 60 years grouped in one age group (indicated by '60').

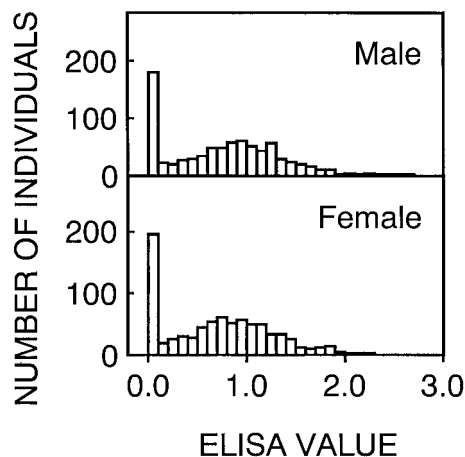


Fig. 2. Frequency distribution of ELISA values for IgG antibody to *Toxoplasma* determined for 836 males and 857 females.

prevalences of antibody in human populations depend on geographic, climatic, hygienic, and socioeconomic conditions, as well as on the lifestyle of the population. All of these factors are considered to be related to the opportunity for an individual to accidentally ingest either of the above two forms of the *Toxoplasma* organism.

Housecats are common in Jakarta. The results of an antibody survey in domesticated cats in Indonesia showed a 35-73% prevalence, as reviewed by Gandahusada (17). Therefore, the oocyst form is considered as a basically important factor in the acquisition of *Toxoplasma* infection in the Jakarta population, which situation is similar to that described in Surabaya (26).

Pork is an important source of infection through cysts found in raw or undercooked meat. A recent survey in pigs in Indonesia revealed *Toxoplasma* antibody prevalences of 3.6% in Sumatra and 9.2% in Sulawesi (20). This source of infection, however, is not necessarily important in Jakarta from an epidemiological aspect, given the religious precepts of the general population. Alternatively, goat and chicken meat are considered potential sources of infection with the cyst form. The prevalence of infection among goats at a slaughterhouse in Jakarta was 48% (28).

The present survey among Jakarta inhabitants revealed a considerably higher overall prevalence (70%) than the

previously reported values (10 to 12.5%) in the same city (29,30). This increase may be partially due to a difference in the serological tests used and among study subjects in this study and earlier surveys.

The prevalence of antibody in females was almost the same as that in males in the Jakarta population, while in our previous studies, Surabaya populations showed higher antibody prevalences in males than in females (26). Further studies would be needed to elucidate epidemiological factor(s) relating to the high prevalence among Indonesian populations.

ACKNOWLEDGMENTS

We thank Mr. Rachmad Soleh of the Ultramed Laboratory for assisting us in collecting serum samples and Dr. Uga of Kobe University School of Medicine for transportation of the sera.

This study was partially supported by the Japan Society for the Promotion of Science.

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