

Prevalence of Anti-Toxoplasma Antibodies and  
Hygienic Problems among Unmarried Young Women

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SUMMARY : We investigated the prevalence of anti-Toxoplasma antibodies in the general population, and among unmarried young women who were freshmen in the College of Medical Care and Technology, Gunma University. The frequency of anti-Toxoplasma antibodies among general population increased gradually from 0.7% in the under 19 year age group to 35% in the 80 to 99 year age group. Up to the age of 29 years (young age group), 2.8% had the antibody, between the age of 30 to 59 years (middle age group) 18.6%, and from the age of 60 and over (old age group) 34.2%. However, the level of titers in the young age group was higher than the others. The finding indicates recent infection of Toxoplasma gondii in the young age group. In the study of the year-to-year changes among freshmen from 1987 to 1992, there has been an obvious decrease in frequency. Nineteen out of 472 subjects (4.0%) had the antibody in 1987, and 12 out of 503 (2.4%) in 1992. The result indicates the risk of primary infection among young people.

#### INTRODUCTION

Toxoplasmosis is widely prevalent in most of the world, and the highest prevalence in humans is found in tropical and moist climates (1). Humans are infected either by the ingestion of tissue cysts in undercooked meat or by ingestion of oocysts in soil. Transmission of tachyzoites can occur by blood transfusion. When a human is infected by the parasite, the antibody is produced in 1 to 2 weeks, and the proliferation of

the parasite is stopped. However, if a pregnant woman is infected with parasites for the first time in the early stages of pregnancy, since she does not have the antibody, she may develop parasitemia, and the parasite may infect the fetus through the placenta (2,3). Infection of the fetus may cause serious diseases such as retinochoriotitis, hydrocephalus and psychomotor disturbances (4). Sato and Ogawara reported that the frequencies of anti-Toxoplasma antibodies among college students of the Gunma University were very low, at about 4% in both sexes in 1987 (5).

In the present paper, we investigated the prevalence of anti-Toxoplasma antibodies in the general population, and then the freshmen of a college to study the frequencies of anti-Toxoplasma antibodies among unmarried young women. Next, we discussed the result from the viewpoint of preventive medicine.

#### MATERIALS & METHODS

Sera samples were collected from unmarried young (18 to 20 years old) student volunteers of the College of Medical Care and Technology, Gunma University. The other samples came from a general population of volunteers from 18 to 99 years of age. Details of the study populations are given in Table 1.

Anti-Toxoplasma antibody titers were detected by a microtiter method using a latex agglutination test kit (Toxo-Test EIKEN, Eikenkagaku KK, Tokyo). The latex agglutination test has been accepted as a standard method for mass-survey because it affords an accurate reflection of Toxoplasma infection (6). Two-fold diluted sera samples were applied to wells (25  $\mu$ l/well) in a polystyrene plate, and then 25  $\mu$ l of suspended latex particles with

Table 1 Distribution of study population

Age Group (Years)	Male No.	Female No.	Total No.
18~19	11	270	281
20~29	20	228	248
30~39	77	43	120
40~49	164	57	221
50~59	102	62	164
60~69	77	61	138
70~79	70	50	120
80~99	32	78	110
Total	553	849	1402

Toxoplasma antigen was added to each well and mixed by a micro mixer (Taiyo Kagaku KK., Tokyo). After leaving the plate overnight at room temperature, the wells were examined for coagulation. Latex agglutination titers greater than 1:32 were determined positive.

#### RESULT & DISCUSSION

Prior to the study of the prevalence of Toxoplasma infection among young unmarried freshmen, a total of 1,402 sera from apparently healthy Japanese of both sexes living in Gunma, aged from 18 to 99 years, were investigated by the latex agglutination test. The overall frequency of anti-Toxoplasma antibody positivity increased gradually from 0.7% in the under 19 year age group to 35.5% in the 80 to 99 year age group, as shown in Fig. 1.

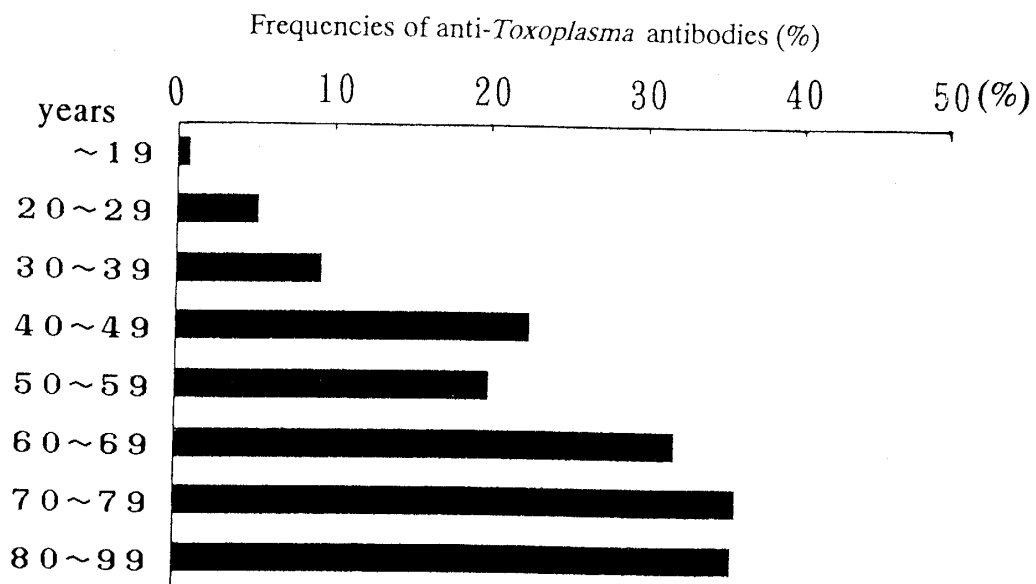


Fig. 1 Frequencies of anti-*Toxoplasma* antibodies in the general population.

An obvious jump was observed between the 30 to 39 year age group and the 40 to 49 year age group. While the frequency of anti-Toxoplasma antibodies was as little as 9.2% in the 30 to 39 year age group, it increased to 22.6% in the 40 to 49 year age group. This jump could be explained by the hygienic improvement after World War II in Japan, for example, well-kept pets, the

improvement of living conditions, or the wide spread of hygienic education.

The anti-Toxoplasma antibody titers increase swiftly during the acute phase of the disease, and are low in chronic cases (1). For the purpose of studying the level of antibody titers, we divided the population into three groups, the young age group under the age of 29 years, the middle age group between the age of 30 to 59 years, and the old age group from the age of 60 and over. The frequencies of the anti-Toxoplasma antibodies in each age group are given in table 2.

Table 2 Frequencies of anti-Toxoplasma antibodies in each age group

Among the young age group, 15 out of 529 subjects (2.8%) had the antibody; in the middle age group, 94 out of 505 subjects (18.6%); and in the old age group, 126 out of 368 subjects (34.2%). The antibody titers in each age group are showed in

Years	Subjects		Positive	
	No.	(%)	No.	(%)
18~29	529	(37.7)	15	(2.8)
30~59	505	(36.0)	94	(18.8)
60~99	368	(26.2)	126	(34.2)
Total	1402	(100.0)	235	(16.8)

Fig. 2. The antibody titers in the young age group were higher than the others. This was probably caused by a recent infection of Toxoplasma gondii in the young age group.

Then, we investigated the freshmen in our college every 6 years to study the frequencies of anti-Toxoplasma antibodies among unmarried young women. As shown in Fig. 3, there has been a gradual decrease in frequency from 1987 to 1992; 19 out of 472 freshmen had the antibodies (4.0%) in 1987 while only 12 out of 503 (2.4%) were positive in 1992. The data show that more young people are nonimmune to toxoplasmosis and are at risk of primary infection. The high risk of primary infection among pregnant women may result in greater occurrence of serious congenital toxoplasmosis (6).

In 1988, Hirai et al (7) claimed that the frequency of anti-Toxoplasma antibody carriers was 10% for the age from 21 to 30 years. Our result in 1992 was, however, only 2.4% in the similar

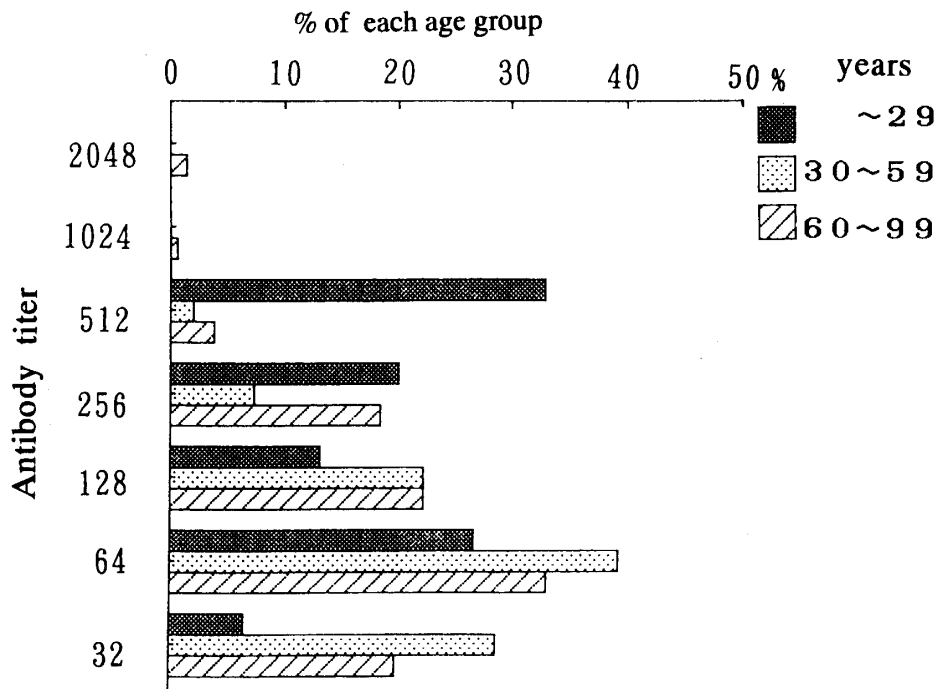


Fig. 2 Prevalence of anti-Toxoplasma antibody titers in each age group.

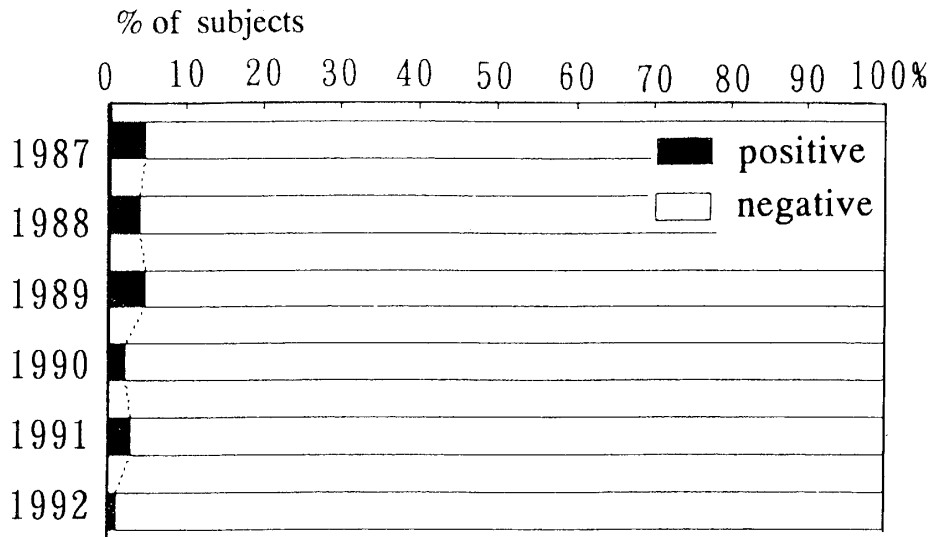


Fig. 3 Year-to-year changes of anti-Toxoplasma antibodies among freshmen at Gunma University from 1987 to 1992.

age group . This means that the positive rate has been constantly decreasing. On the other hand, from the most recent report, the Toxoplasma antibody carrier rate was 28.4% for those 17 to 18 years of age in Italy, and 17.4% for those 13 to 20 years of age at Islamabard in Pakistan (8,9). In 1988, Sato et al(10) reported that the seroprevalence of anti-Toxoplasma antibodies was 63.3% for the 10 to 19 age group of Tome-Acu inhabitants at the Amazon basin in Brazil.

The high seroprevalence of the anti-Toxoplasma antibodies in various areas of the world indicates a higher chance of infection in these areas than in Japan. Recently, as increasing number of Japanese, especially young people, travel abroad, the chance of infection from Toxoplasma gondii inevitably increase. Moreover, we found one case among a woman student who had a high antibody titer (1:4096 positive) without any evidence of infection. Knaus reported that the overall infection rate of people by Toxoplasma in the region of Cottbus independent of age, sex and consumption of raw meat was 100 out of 3665 (35.6%); Probands of the urban settlement area show a rate of 37.9% (n=3402), indicating a higher degree of the infection than probands living in the country with a rate of 30.9% (n=2656)(11). It is suggested that a guideline should be made for travelers going abroad, explaining preventive hygiene of Toxoplasmosis and the possible routes of Toxoplasma infection, such as, touching cats, playing on the ground soiled by cats' feces and the ingestion of uncooked meat.

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