

Serological study of the prevalence of toxoplasmosis in asymptomatic patients infected with human immunodeficiency virus

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SUMMARY

Asymptomatic individuals seropositive for antibody to human immunodeficiency virus (HIV) were investigated for the presence of toxoplasma specific antibody. Serological examination was performed using multiple assays. Of 500 patients studied 133 had serological evidence of previous exposure to *Toxoplasma gondii*. Specific IgM was detected in 7 patients using ISAGA and 2 patients by DS-ELISA. The immunoglobulin-G annual seroconversion rate was calculated to be 0.75%. The results of this study indicate 27% of HIV positive patients in the UK are at risk of developing life-threatening secondary reactivation of cerebral toxoplasmosis in association with AIDS. A further 0.5–1% per year may suffer primary toxoplasmosis.

INTRODUCTION

Cerebral toxoplasmosis is a well recognized opportunist infection of patients with the Acquired Immune Deficiency Syndrome (AIDS) [1]. In the USA, the incidence of this life-threatening condition has been estimated to range between 3% and 40% of patients with AIDS and one projection suggests 20000 to 40000 cases of cerebral toxoplasmosis will be seen in that country by 1991 [2]. In North America, accumulated data indicate that most cases of cerebral toxoplasmosis result from a reactivation of the patients chronic, previously latent infection [3]. By comparison, in countries such as France, where the incidence of toxoplasmosis is high, a larger proportion of central nervous system toxoplasma infections are associated with a primary infection [2]. The risk of an AIDS patient with serological evidence of previous exposure to toxoplasma developing cerebral infection has been estimated as 30% [4]. Occasional cases of cerebral toxoplasmosis have been reported [5] but there have been few studies of this disease in the UK. Consequently, asymptomatic human immunodeficiency virus (HIV) seropositive patients in South East England were investigated for evidence of acute and chronic toxoplasma infection and the likely proportion of AIDS patients susceptible to cerebral reactivation and primary infection was studied.

METHODS

Asymptomatic individuals with demonstrable antibody specific to HIV-1 were selected for inclusion in the study. Serum samples were examined for the presence of toxoplasma specific antibody using the dye test (DT) and latex agglutination test (LAT) as described previously [6]. The dye test was performed using a doubling dilution series commencing with neat serum so that 2 international units (IU) of specific immunoglobulin or more could be detected. When the DT findings were ≥ 2 IU and the LAT was reactive $\geq 1:16$, the patient was classified as having had previous exposure to *Toxoplasma gondii*. Findings of DT < 2 IU and LAT $< 1:16$ indicated no evidence of toxoplasma infection. In cases of confirmed discrepancy a direct agglutination test (DA) was performed [7] and the patient said to have been infected if the finding was ≥ 4 units. Toxoplasma-specific IgM was measured by a double sandwich enzyme linked immunosorbent assay (DS-ELISA) and an immunosorbent agglutination assay (ISAGA) as described previously [8].

Specimens sent from laboratories known to perform on-site toxoplasma serological tests with selective referral were excluded from the analysis as were samples where the age and sex of the patient was not recorded.

RESULTS

A total of 719 HIV positive patients were investigated of which 500 had documentation of age and sex to permit full analysis. Only four of the 500 patients in the study group were female and separate analysis by gender was not performed. The patients were aged from 12 months to 66 years with an average of 36 years. Insufficient details of predisposing factors were available to permit separate analysis of homosexual/bisexual, heterosexual contacts or drug abusers. Toxoplasma serology findings in the different age groups are presented in Table 1. The annual seroconversion rate was calculated as 0.75%. Seven of the patients exposed to *T. gondii* had specific IgM detected by ISAGA and two were reactive by DS-ELISA.

DISCUSSION

Extrapolating from the current findings, over a quarter of the HIV positive patients will be at risk of developing cerebral toxoplasmosis in association with AIDS. American studies indicate that 30% of AIDS patients previously exposed to toxoplasma suffer a cerebral reactivation [4]. Consequently, it may be calculated that 8% of AIDS patients in South East England will experience a life-threatening episode of cerebral disease following secondary reactivation of toxoplasmosis. In addition 0.5–1% of these patients may acquire primary toxoplasmosis associated with AIDS each year reflecting the incidence of toxoplasma infection in this group.

The incidence of primary toxoplasmosis amongst AIDS patients will reflect the level of dietary and environmental exposure to the parasite. Although the present study has produced an annual seroconversion rate for asymptomatic individuals previously exposed to HIV, significant changes in dietary or behavioural practices

Table 1. Seroprevalence of toxoplasmosis in 500 HIV positive patients

Age (years)	Seropositive	Seronegative	Percentage seropositive
< 20	1	10	9
20-29	28	93	23
30-39	47	168	22
40-49	40	80	33
50-59	13	14	48
≥ 60	4	2	67
Total	133	367	27

after the development of AIDS may affect the numbers of cases of primary toxoplasmosis observed. Consequently, prospective studies of AIDS patients are required to establish the true incidence of primary infection. In other patient groups, the persistence of detectable toxoplasma specific IgM following exposure to the parasite may be prolonged. The ISAGA has been shown to exhibit superior sensitivity to that of DS-ELISA [8] and this is demonstrated by the greater number of reactive HIV patients. Taking DS-ELISA reactivity to persist for an average of 8 months and that of ISAGA for 18 months, the findings for IgM detection are compatible with the annual seroconversion rate calculated from IgG prevalence. Extrapolating from the results of this study, the ratio of secondary to primary toxoplasma infection in association with AIDS observed in the UK would be 10-15:1.

The seroprevalence of toxoplasmosis in HIV infected patients in South East England has been found to be similar to that in North America. In parts of continental Europe and Africa the incidence of toxoplasmosis in the general population is high and the frequency of both primary and secondary toxoplasmosis in AIDS patients may be marked. The seroprevalence of toxoplasmosis amongst HIV infected individuals in these regions requires separate investigation. While the proportion of toxoplasma infected AIDS patients developing cerebral disease has been established in North America, prospective studies should be undertaken in other areas where the predominant predisposing factors for HIV and toxoplasma infection may differ.

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