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Original Research Article

Risk factors of *Toxoplasma encephalitis* among people living with HIV/AIDS at Wangaya hospital in Denpasar, Bali, Indonesia: a case control study

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ABSTRACT

Background: *Toxoplasma encephalitis* (TE) is the most frequent AIDS-related opportunistic infection. *T. gondii* infects the human population in both developed and developing countries. Toxoplasmosis among PLWHA manifests primarily as a life-threatening condition, TE, brain abscesses and death. Objective was to identify the risk factors of *Toxoplasma encephalitis* (TE) among people living with HIV/AIDS (PLWHA).
Methods: A case control study was conducted during May to November 2018. The study participants consisted of 90 PLWHA; 30 PLWHA with history of TE (cases) and 60 PLWHA without history of TE (controls). Data such as: socio-demographic, laboratory results, head CT scan findings were collected from the medical record and was analyzed using SPSS version 18.
Results: A total of 90 participants PLWHA were enrolled, 30 participants as cases and 60 participants as a control. 49 (54.4%) participants were males and 41 (45.6%) participants were females. Among the risk factors evaluated; the lower lymphocyte level (p=0.016), the lower cluster differentiation (CD) 4 level (p=0.003), no taking highly active antiretroviral therapy (HAART) (p=0.000) were observed to be an independent associated risk factor of TE.
Conclusions: Our findings suggest lower lymphocyte levels, lower CD4 count and no taking HAART may constitute a significant associated risk factor for TE in PLWHA.

Keywords: People living with HIV/AIDS, *Toxoplasma encephalitis*, Associated risk factors

INTRODUCTION

Toxoplasma encephalitis (TE) is the most frequent AIDS-related opportunistic infection. *T. gondii* infects approximately 30 to 50% of the human population in both developed and developing countries.[1-5] In majority of immunocompetent human hosts, *T. gondii* ensue a latent infection characterized by the persistence of organism in tissues such as brain, skeletal muscles and heart without any signs and stmptoms.[3,6,7] In chronically infected individuals who develop defects in cell-mediated immunity/immunocompromised patients/patients infected with HIV, a symptomatic disease more likely occurs as a result of reactivation of latent infection, especially if their CD4 count decreases below 200 cells/µl.[8] Toxoplasmosis among PLWHA manifests primarily as a life threatening condition, TE, brain abscesses and death.[9,10]

Considering that there are no TE associated risk factors data in our hospital. This study was designed to identify

the potential risk factors associated with TE among PLWHA who were visit to Wangaya Hospital in Denpasar, Bali, Indonesia.

METHODS

Study population

The participants were including all adults PLWHA (≥18 years of age) who are medical out patients at Wangaya Hospital in Denpasar, Bali, Indonesia. The participants were consisted of two groups: 30 people living with HIV/AIDS (PLWHA) with history of TE as a case and 60 PLWHA without history of TE as a control. Diagnosis of TE was based on presumptive criteria include the clinical signs and symptoms, neuroimaging findings (CT scan of the head) which were compatible with TE and the response to therapy for Toxoplasmosis. Serological study for Toxoplasma IgG was not routinely performed to all patients because of facility constraints in our hospital. Data was obtained from Wangaya Hospital, between May to November 2018.

Inclusion criteria

The cases were PLWHA who had been diagnosed with TE, regardless of the outcome. Exclusion criteria for cases were PLWHA with no documented CD4 counts. Inclusion criteria for the controls were PLWHA without history of TE, who still on treatment in Wangaya hospital or documented death because of opportunistic infection other than TE.

Exclusion criteria

The controls were loss to follow up patient and PLWHA with no documented CD4 counts.

Socio-demographic and risk factors

We obtained the socio-demographic and associated risk factors data of PLWHA with TE and without TE through medical record study in Wangaya Hospital of Denpasar, Bali, Indonesia. We explored the relationship between HIV infection and risk factors of TE including CD4 counts, cotrimoxazole prophylaxis, hemoglobin level, neutrophil to lymphocyte ratio. Socio-demographic data obtained included age, sex, education level and occupation status.

Statistical analysis

The data was analyzed by using the statistical software SPSS version 18. Characteristic data of socio-demographic were performed as a descriptive statistic in terms of relative frequency (number and percent). The risk factors measured at categorical level and association were examined in 2x2 contingency tables, 95% confidence intervals (CI), and p values ($p<0.05$).

RESULTS

Basic characteristics of 90 participants with and without TE are presented in (Table 1). Age ranged from 20 to 59 years with mean±SD: 36.37±9.27. Regarding sex, the participants were predominant male: 49 (54.40%) and female: 41 (45.60%). The education level was majority consist of high school: 48 (53.30%), 64 (71.10%) were employed. About 73 (81.10%) of participants were taking prophylaxis cotrimoxazole. The laboratory results: neutrophyl level: 61.59±16.41; lymphocyte level: 23.74±12.38; neutrophyl/lymphocyte ratio: 3.39±3.58 and CD4 count: 137.12±15.69 (Table 1).

Table 1: Socio-demographic and risk factors characteristic (n=90).

Characteristics	Mean ± SD / N (%)
Age (years)	36.37±9.27
Sex	
Male	49 (54.40)
Female	41 (45.60)
Education level	
Elementary School	10 (11.10)
Junior High School	21 (23.30)
High School	48 (53.30)
University	11 (12.20)
Employee status	
Employed	64 (71.10)
Unemployed	26 (28.90)
Prophylaxis cotrimoxazole	
Yes	73 (81.10)
No	17 (18.90)
Lymphocyte	23.74±12.38
CD4	137.12±157.69
Taking HAART	
Yes	71 (78.90)
No	19 (21.10)

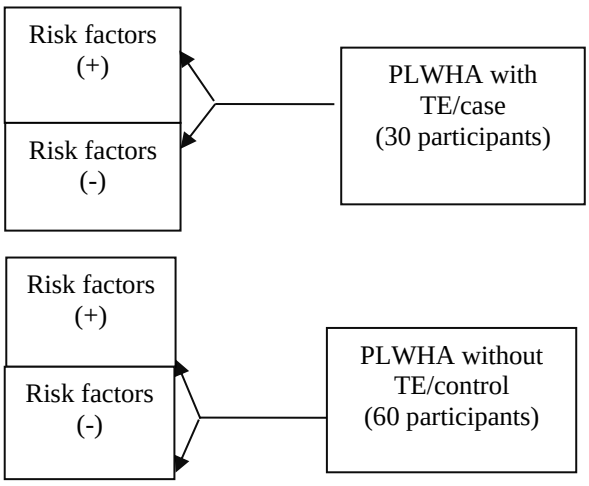

Figure 1: Study algorithm.

DISCUSSION

The immunodeficiency due to HIV infection were considere associated with progressive decrease of CD4 T lymphocytes. The CD4 count lower than 350 cells/µl favoring the reactivation of opportunistic infection such as Toxoplasma encephalitis.[11]

This study found TE was significantly associated with lymphocyte levels (p=0.016), CD4 counts (p=0.003), taking HAART (p=0.000) (Table 2). Silva FCD et al and some others study reported that TE was significantly associated with CD4 counts (p<0.001), taking HAART (p=0.013).[11-15] Lavu EK et reported that TE was significantly associated with lymphocyte levels (p=0.000).[16]

Table 2: Univariate analysis of risk factors associates with *Toxoplasma encephalitis* (n=90).

Variable	Case (N=30) N (%)	Control (N=60) N(%)	P value
Age			
< 35	16 (53.33%)	29 (48.33%)	0.655
≥ 35	14 (46.67%)	31 (51.67%)	
Sex			
Male	18 (60.00%)	31 (51.70%)	0.454
Female	12 (40.00%)	29 (48.30%)	
Education level			
Elementary School	5 (16.70%)	5 (8.30%)	0.159
Junior High School	9 (30.00%)	12 (20.00%)	
High School	11 (36.70%)	37 (61.70%)	
University	5 (16.70%)	6 (10.00%)	
Employee status			
Employed	20 (66.70%)	44 (73.30%)	0.511
Unemployed	10 (33.30%)	16 (26.70%)	
Prophylaxis cotrimoxazole			
Yes	5 (16.70%)	48(80.00%)	0.703
No	25 (83.30%)	12(20.00%)	
Lymphocyte			
< 25	16 (84.20%)	32 (53.30%)	0.016*
≥ 25	3 (15.80%)	28 (46.70%)	
CD4 counts			
<151	25 (83.30%)	31 (51.70%)	0.003*
≥ 151	5 (16.70%)	29 (48.30%)	
Taking ARV (HAART)			
No	16(53.30%)	3 (5.00%)	
Yes	14(46.70%)	57(95.00%)	0.000*

Bivariate analysis (*Chi*-square) with *significant p<0.05**

This study revealed that statistically there were not significant association between possible risk factors: age (p=0.655), sex (p=0.454) (Table 2). Luma et al and some others study reported that TE was not depending on age and sex.[15,17-20] Khattak et al also revealed that statistically there were not significant association between TE and age (p=0.405), sex (p=0.744).[21] Nissapatorn et al found that the toxoplasma infection rate does not depend on the patients sex (p=0.551) and age (0.834).[20,21] This is consistent with other study, that there is not different the toxoplasma infection rate for male and female (p=0.1000).[9,11, 22-24] This study also revealed that statistically there were not significant association between education level (p=0.159), employee status (p=0.511), prophylaxis cotrimoxazole (p=0.703) (Table 2). Nazari et al reported that toxoplasmosis was not depending on educational level (p=0.898).[22] Negussie A et al also reported that toxoplasmosis was not depending on educational level (p=0.877).[25]

This study also revealed that statistically there were not significant association between employee status (p=0.641), prophylaxis cotrimoxazole (p=0.099) (Table 2).[22] Some similar studies revealed that toxoplasmosis was not depending on educational level : (p=0.23), (p=0.248), (p=0.715).[10,23,24] Ebrahim-Saraie et al reported that toxoplasmosis was not depending on age (p=0.07), sex (p=0.52), taking HAART (p=0.99).[26]

CONCLUSION

We conclude that low level of lymphocyte, low level of CD4 counts and no taking HAART are a significant risk factors contributing to the occurrence of *Toxoplasma encephalitis* in PLWHA.

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