ORIGINAL ARTICLE

OVERVIEW OF OCULAR TOXOPLASMOSIS IN DR KARIADI HOSPITAL SEMARANG: A 5-YEAR RETROSPECTIVE STUDY

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ABSTRACT

Introduction: *Ocular toxoplasmosis is the most common infectious etiology of posterior uveitis. The aim of this study is to describe the clinical characteristics of ocular toxoplasmosis in Dr. Kariadi Hospital, Semarang.*

Methods: *A retrospective review of out-patient medical records of ocular toxoplasmosis at Dr. Kariadi Hospital Semarang from January 2018 to December 2022 was done. All toxoplasmic uveitis were included, whereas incomplete medical records and loss of follow-up were excluded. The clinical characteristics of patients were recorded and analyzed.*

Results: *During 5 years a total of 160 patients were recruited of which 123 fulfilled the criteria, consisting of 47 males (38.2%) and 76 females (61.8%), mostly were acquired infection (97.6%) with immunocompetent status (75.6%), and affected unilateral eye (65%). The predominant age was 26-45 years old (41.5%). Primary infection (70.7%) was greater than recurrent infection (8.9%) in which recurrence affects 46-65 years old (72.7%). Visual acuity at the initial presentation was <6/18-6/60 (26.2%), and the final follow-up increased to ≥6/18 (33.1%). Posterior uveitis (35.1%) with posterior pole lesion (66%) was a common clinical sign found. Medications given were trimethoprim-sulfamethoxazole (51,3%), and corticosteroid (27.5%) as an adjuvant. The complication detected was cataract (13%).*

Conclusion: *Ocular toxoplasmosis was mostly found in immunocompetent male patients, acquired, unilateral, and in the posterior pole. A good response was found by trimethoprim-sulfamethoxazole and corticosteroid medications.*

Keywords*: Ocular Toxoplasmosis, Clinical Characteristics, Medication, Complications.*

INTRODUCTION

Ocular toxoplasmosis is a common infection that causes retinochoroiditis, which is responsible for 5-20% of blindness in developed countries and about 25% in developing countries. Ocular toxoplasmosis has different clinical characteristics and patterns among countries, and the prevalence may vary.[1] The clinical pattern and prevalence of ocular toxoplasmosis are highly dependent on age, sex, race, genetics, and environmental factors.[2] Ocular toxoplasmosis typically presents with floaters, blurred vision, and a red eye. To make the diagnosis, the doctor will search for signs of focal necrotizing retinochoroiditis, which is one of clinical sign of eye infection caused by the parasite *Toxoplasma gondii*. Less commonly, people may experience symptoms of ocular toxoplasmosis at the same time they are infected with the parasite.[3-5] Primary infection by toxoplasmosis is usually asymptomatic in the

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immunocompetent host. It can occasionally cause acute systemic illness leading to nonspecific constitutional symptoms such as fevers, chills, sweats, and lymphadenopathy.[6]

The pattern and characteristics of ocular toxoplasmosis in the Asia Pacific region are different compared to countries in Europe, America, and other parts of the world. In the United States, it's estimated that 22.5% of people have *T. gondii* infection, but the prevalence of ocular toxoplasmosis is only 2%. In Brazil, it's estimated that 60-80% of the population has *T. gondii* infection, but only 18% of people with retinochoroiditis.[7,8] In Indonesia, it's been reported that 43-88% of people have *T. gondii* infection, but there was no exact number of ocular toxoplasmosis prevalence in Indonesia.

Due to the limited data on the incidence of ocular toxoplasmosis in Indonesia, we conducted a retrospective study to find out more about the clinical characteristics, medications, and complication of ocular toxoplasmosis in the tertiary hospital of Dr. Kariadi Semarang.

METHODS

A retrospective study of 123 patients (166 eyes) with ocular toxoplasmosis in Dr. Kariadi Hospital, Semarang was held. Inclusion criteria were all ocular toxoplasmosis patients registered as out-patients in eye clinic from January 2018 - December 2022. Exclusion criteria were patients with inconsistency between ICD-10 diagnosis and medical record diagnosis, patients who had incomplete medical records, and lost of follow-up.

Ocular toxoplasmosis is an infection of the *T. gondii* parasite in the eye, which is typically presents with white-creamy retinal lesion. Diagnosis should be confirmed with a positive serological test.[9-10]

The characteristics of sex (male or female), age (according to Health Department of Indonesia), mode of infection (congenital or acquired), immune status (immunocompetent or immunocompromised), type of infection (primary active, recurrent active, or inactive), bilaterality (unilateral or bilateral), visual acuity (according to World Health Organization), clinical sign (anterior, intermediate, posterior uveitis, panuveitis, or scar chorioretina), location of lesion (perifer, posterior pole, or both), medication, and complication were obtained from medical records. Snellen chart was used to assess visual acuity. Clinical signs, location of lesion, and complication were obtained from examination using slit lamp, 78D or 90D Volks© condensing lens, and non-contact tonometry.

The research results were processed using Windows Microsoft Excel 2019 and inputted in tabular form. The study was approved by the research ethics committee of Medical Faculty Diponegoro University.

RESULTS

From January 2018 - December 2022, there were 160 patients registered with ocular toxoplasmosis, 37 patients were excluded and 123 patients (166 eyes) were included in the study. The demographic characteristics of the patients are shown in Table 1.

Table 1. Demographic characteristics of ocular toxoplasmosis patients (n=123)

Demography Characteristic	Frequency	%
Sex		
Men	76	61.8
Women	47	38.2
Age		
0 - 5 y.o	3	2.4
6 - 11 y.o	1	0.8
12 - 25 y.o	40	32.5
26 - 45 y.o	51	41.5
46 - 65 y.o	25	20.4
>65 y.o	3	2.4
Mode of Infection and Immune Status		
Congenital	3	2.4
Acquired:	120	97.6
- Immunocompetent	93	77.5
- Immunocompromised:		
- HIV	27	22.5
	5	4.2
- Non-HIV	22	18.3

The predominant age of our study was 26 - 45 y.o (41.5%). Ocular toxoplasmosis patients were composed mainly 76 (61.8%) men with immunocompetent immune states (77,5%).

There are 80 (65%) patients with ocular toxoplasmosis in this study who experienced unilateral symptoms. The common visual acuity at initial presentation in this study was 46 (26.2%) patients which had range <6/18-6/60 and the final follow-up increased to ≥6/18 on 58 (33.1%) patients.

Primary infection which happened in 87 (70.7%) patients, was greater than recurrent infection (8.9%). Posterior uveitis (35.1%) with posterior pole lesion (66%) was a common clinical sign found.

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Table 2. Clinical characteristics of ocular toxoplasmosis patients (n=123)

Clinical Characteristic	Frequency	%
Bilaterality		
Unilateral	80	65
Bilateral	43	35
Visual Acuity at Initial		
≥ 6/18	44	25.1
<6/18-6/60	46	26.2
<6/60-3/60	22	12.6
<3/60-1/60	33	18.9
<1/60-LP	29	16.6
NLP	1	0.5
Visual Acuity at Final		
≥ 6/18	58	33.1
<6/18-6/60	50	28.6
<6/60-3/60	19	10.9
<3/60-1/60	26	14.9
<1/60-LP	19	10.9
NLP	3	1.6
Type		
Primary active	87	70.7
Recurrent active	11	8.9
Inactive	25	20.3
Clinical Sign		
Anterior uveitis	33	11.5
Intermediate uveitis	85	29.5
Posterior uveitis	101	35.1
- Papilitis	19	18.8
- Retinal vasculitis	14	13.9
- Retinal exudate	49	48.5
- Neuroretinitis	19	18.8
Panuveitis	16	5.5
Scar chorioretina	53	18.4
Location of lesion		
Perifer	23	14.7
Posterior Pole	103	66.1
- Macula	34	33
- Non Macula	69	67
Perifer and posterior pole	30	19.2

LP: light perception; NLP: no light perception

Recurrent infection mostly occurred in 46 - 65 y.o women (72.7%). Medication and complication in ocular toxoplasmosis are summarized in Table 4. Approximately 82 patients (51.3 %) were treated with trimethoprim-sulfamethoxazole and corticosteroid (27.5%) as an adjuvant. The most frequent complication detected was cataract (13%).

Table 3. Demographic characteristics of recurrent ocular toxoplasmosis patients (n=11)

Demography Characteristic	Frequency	%
Sex		
Men	3	27.3
Women	8	72.7
Age		
0 - 5 y.o	0	0
6 - 11 y.o	0	0
12 - 25 y.o	0	0
26 - 45 y.o	0	0
46 - 65 y.o	8	72.7
>65 y.o	3	27.3
Mode of Infection and Immune Status		
Congenital	0	0
Acquired:	11	100
- Immunocompetent	11	100
- Immunocompromised:	0	0
- HIV	0	0
- Non-HIV	0	0

y.o: years old.

Table 4. Medication and complication of ocular toxoplasmosis patients (n=123)

Medication	Frequency	%
Trimethoprim + sulfamethoxazole	82	51.3
Pirimetamin	17	10.6
Clindamycin	17	10.6
Azithromycin	3	1.9
Spiramycin	11	0.6
Anti toxoplasmosis + corticosteroid	44	27.5
Complication		
Secondary glaucoma	15	12.2
Complicated cataract	16	13
Retinal detachment	3	2.4

DISCUSSION

We found ocular toxoplasmosis more commonly occurred in men at 26-45 y.o in Dr. Kariadi Hospital. It was similar to the earlier study by Yates (2019), which found that ocular toxoplasmosis was most common in men with a median age of 35.5 y.o.[11] It is because men in productive age work more outside from home so they have a higher risk of being infected with *T. gondii.*[12]

Ocular toxoplasmosis can occur unilaterally or bilaterally. In previous literature, it was stated that ocular toxoplasmosis more commonly occurred unilateral (71,1%), this is in accordance with the results obtained in this study that found in 65% cases.[1]

We observed that the common visual acuity of ocular toxoplasmosis patients at the initial presentation was <6/18-6/60 and the final follow-up increased to ≥6/18 in this study.

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Previous research has shown that the visual acuity of ocular toxoplasmosis patients is affected by the presence of ongoing disease inflammation, macular lesions, and the development of any ocular complication during follow-up.[13] Montoya and Remington stated that as many as 87% of cases improve in visual acuity function unless the lesion is located on the macula.[14]

Manifestation of ocular toxoplasmosis is mostly primary infection of posterior uveitis (35.1%) with posterior pole lesion (66%). This is similar to the retrospective study conducted in Brazil by Aleixo (2016), which found that 77.4% of persons with ocular toxoplasmosis have retinochoroiditis. That matter due to the high degree of affinity *T. gondii* on endothelial cells microvascular in the retina and on the choroidal and retinal membranes eye that causes it leading to inflammation retinochoroiditis.[15]

Clinical manifestation of *T. gondii* infection depends on a person's immunological state. The prevalence of ocular toxoplasmosis was more common in immunocompetent patients in this study. Meanwhile, previous literature stated that *T. gondii* infections are more frequent in immunocompromised patients. In immunocompromised individuals such as HIV/AIDS, cancer, and organ transplant patients who consume corticosteroids, T cells will be damaged.[16] During chronic *T. gondii* infection, T cells such as CD4 and CD8 play a synergistic role in controlling the growth of this parasite. but in individuals who have immune system problems, the destruction of these cells will occur.[17] The destruction of these cells causes people with an immunocompromised state to have a high risk of reactivation of this parasite and causing toxoplasmosis.[16,17]

Recurrent infection in this study mostly happened in 46 - 65 y.o patients (72.7%). That is in line with the prior study by Arruda, et al, which showed that older age (OR 1.02; 95% CI 1.00–1.05; p=0.0493) was the only risk factor associated with recurrence during follow-up.[14,17] In that study also explained about most immunocompetent individuals, *Toxoplasma* cysts remain inactive within or near the retinal scar for a long period. Reactivation of retinitis usually occurs at the border of old scars, with the rupture of tissue cysts releasing organisms into the surrounding retina.[18] Patients who have undergone treatment for ocular toxoplasmosis have demonstrated a significant decrease in recurrence rate compared to those who did not receive treatment (6.6% vs. 23.8%, respectively).[18] Individuals who have a history of frequent recurrences of ocular toxoplasmosis may benefit from long-term therapy to prevent subsequent recurrences.[19]

This research showed that 51.3 % of patients were treated with trimethoprim-sulfamethoxazole and corticosteroid (27.5%) as an adjuvant. Some clinicians do not treat small peripheral retinal lesions, while others treat all patients in order to reduce recurrences and

complication rates. Typically, toxoplasmic retinochoroiditis in immunocompetent patients is expected to resolve within 1 to 2 months. Subsequently, treatment is adjusted to each patient individually. The treatment of ocular toxoplasmosis includes both antimicrobial drugs and corticosteroids (topical and oral) and is maintained for 4–6 weeks. The main target of the antimicrobial treatment at the stage of active retinitis is to control the parasite's multiplication. A prospective clinical trial found no significant differences between classic treatment (pyrimethamine, sulfadiazine) and trimethoprim-sulfamethoxazole. Trimethoprim-sulfamethoxazole is widely used as an alternative treatment, due to low price, drug availability, and similar action as classic treatment. Trimethoprim-sulfamethoxazole had also proven to be effective in reducing the recurrence rate of recurrent retinochoroiditis.[8,20,21,22] Corticosteroids had been given to reduce the duration and severity of the inflammation. This therapy is indicated for sight-threatening macular lesions, severe vitritis, and in immunocompromised patients.[23]

Complications of ocular toxoplasmosis can arise due to the course of the disease or minimal response to therapy. Complications of ocular toxoplasmosis that found in this study were complicated cataracts (13%), secondary glaucoma (12.2%), and retinal detachment (2,4%). Cataracts are a frequent complication of ocular toxoplasmosis due to the course of the disease.[24]

This retrospective study has several limitations. First, some patients had been treated by the internist, as a result, the policy in providing therapy is not uniform. Second, there is a potential confounding effect of taking medication history of the patient before they are referred to us.

We recommend that this study can be continued with additional parameters such as the duration of medication in order to learn about the long-term effects of therapy. At this time, we can not perform *Polymerase Chain Reaction* (PCR) examination with a small amount of ocular sample. In the future, we hope that it can become a research parameter and give us more insight into establishing the diagnosis.

CONCLUSION

A retrospective study of ocular toxoplasmosis from January 2018 - December 2022 in Dr. Kariadi Hospital, was mostly found in immunocompetent male patients, acquired, unilateral, and with the posterior pole lesion. Recurrent infection mostly happened in the elderly age with immunocompetent immune status. A good response was found by trimethoprim-sulfamethoxazole and corticosteroid medications.

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