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SUPPLEMENTAL ISSUE: SPECTRUM OF UVEITIS IN ASIA PACIFIC
ORIGINAL ARTICLE

The Spectrum of Uveitis in Southern Vietnam

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ABSTRACT

Purpose: To describe the pattern of uveitis among Vietnamese at two eye hospitals in Southern Vietnam.

Methods: We retrospectively reviewed the charts of 212 consecutive uveitis cases that presented to two eye hospitals in Ho Chi Minh City, Vietnam, from July 2011 to February 2015. The patients were identified from a database maintained by the hospitals. Patients with keratitis, episcleritis, orbital inflammation, post-surgical endophthalmitis, traumatic iritis, and corneal graft rejection were excluded. Data collected included demographic, clinical, and laboratory findings.

Results: Uveitis was seen most commonly in the 21–60-year-old age group. Gender distribution was not significantly different among the various age groups. Anterior uveitis was the most common (46%), followed by posterior uveitis (22%), panuveitis (18%), and intermediate uveitis (14%). Infectious etiologies were observed in 27%. Idiopathic uveitis (36%) was the most common non-infectious uveitis, followed by Vogt–Koyanagi–Harada disease (14%) and Behçet disease (7%). Tuberculous uveitis was the most common infectious etiology (9%), followed by toxocariasis (6%) and herpetic uveitis (6%), and cytomegalovirus anterior uveitis (4%).

Conclusions: In southern Vietnam, infectious uveitis, such as tuberculosis, toxocariasis, and herpetic infection, are common but toxoplasmosis is rare. Idiopathic uveitis, Vogt–Koyanagi–Harada disease, and Behçet disease are the most common non-infectious uveitis, with a notable absence of birdshot retinochoroidopathy.

Keywords: Behçet, epidemiology, toxocariasis, tuberculosis, uveitis, Vogt–Koyanagi–Harada

Uveitis is an important group of ophthalmic conditions globally. Although it is less common than other conditions, such as diabetic retinopathy and age-related macular degeneration, it accounts for up to 15% of all legal blindness,[1] especially among individuals of working age.[2] Therefore, it can result in a significant burden to the affected individuals and to society.[3]

The presentation of uveitis can vary with factors such as genetic, geographic, and environmental.[4] Infectious etiologies are more common in tropical and developing countries,[5] whereas non-infectious uveitis, such as Behçet disease (BD) and Vogt–Koyanagi–Harada (VKH) disease are more common in developed countries, such as Japan.[6] Up until now, there has been a lack of data from Vietnam and there exists a need to address this, as epidemiologic knowledge is important to serve as a guide to clinicians in their consideration of differential diagnoses and clinical investigations. This study aims to describe the pattern of uveitis among Vietnamese patients at two eye hospitals in Ho Chi Minh City, Southern Vietnam.

MATERIALS AND METHODS

We conducted a retrospective chart review of Vietnamese residents with uveitis who were seen at two eye hospitals (one public and one private hospital) by two authors (M.N. and V.Q.H.D.) in Ho Chi Minh City from July 2011 to February 2015. The patients

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were identified from a database of all patients who attended the clinics within the study period. Post-surgical exogenous endophthalmitis, orbital inflammatory disease, pseudoexfoliative syndrome, traumatic iritis, corneal graft rejections, episcleritis, and scleritis were excluded from this study. Patients who were not residents of Vietnam were also excluded from the study.

The data was entered into an electronic database using Microsoft Excel software version 14.6.0, and collected data included age, gender, laterality, etiology, anatomic location, type of keratic precipitates (granulomatous or nongranulomatous), onset, duration and course of inflammation, and the reason for the permanent visual loss where applicable. The terminology and classification of uveitis were in accordance with the Standardization of Uveitis Nomenclature working group criteria.[7] Inflammation lasting <3 months was defined as acute uveitis, whereas inflammation lasting longer than 3 months was defined as chronic uveitis. Uveitis was classified as granulomatous if at least one of the findings of large mutton-fat keratic precipitates, iris nodules, optic disc, or choroidal granulomas was present.

Patients were assessed at the clinic with a detailed review of the current history, family history, exposure status such as pets, occupation, social and travel history, and a systemic medical review. An assessment of the best-corrected visual acuity, tonometry, slit-lamp biomicroscopic, and indirect ophthalmoscopic examination was performed for all patients, followed by a targeted investigation to look for infectious and inflammatory etiologies. Ophthalmic diagnostic investigations, such as optical coherent tomography, fluorescein angiography, visual field testing, and ocular ultrasonography were performed as indicated. Patients with posterior uveitis, panuveitis, or intermediate uveitis with evidence of retinal vasculitis had fluorescein angiography. Initial investigations for all uveitis patients with a first presentation included: a full blood count; erythrocyte sedimentation rate (ESR); C-reactive protein; chest radiograph; tuberculin skin test (TST); venereal disease research laboratory test (VDRL); renal and liver function; and urine formed element microscopy tests. When VDRL was positive, a *Treponema pallidum* hemagglutination (TPHA) test was performed. In patients with a clinical suspicion of tuberculous uveitis (with a presentation of granulomatous anterior uveitis with or without broad posterior synechiae, intermediate uveitis, occlusive retinal vasculitis or choroiditis), and/or a positive tuberculosis (TB) contact history, a positive tuberculin skin test or compatible chest X-ray features, the QuantiFERON-TB Gold assay was performed. Aqueous humor sampling was also performed for TB culture and DNA polymerase chain reaction (PCR) in patients with granulomatous anterior uveitis or intermediate uveitis with a high index of suspicion for TB. Presumed tuberculous uveitis was diagnosed when there were suggestive clinical history and signs, positive TST and/or QuantiFERON-TB Gold assay, chest X-ray findings, response to anti-tuberculosis treatment without relapse for 1 year after stopping adequate treatment in the absence of other known etiologies of uveitis,[8] and in some, the detection of *Mycobacterium tuberculosis* or its DNA in ocular fluid or tissue.

Human leukocyte antigen (HLA)-B27 testing became available at our hospitals in June 2014. Before June 2014, the diagnosis of HLA-B27-associated uveitis was presumed, when there were clinical features of acute nongranulomatous anterior uveitis, severe anterior chamber inflammation with fibrin or hypopyon, which may be recurrent with alternating eye involvement, with compatible lumbar-sacral X-ray features of spondylitis or sacroiliitis, or a known history of seronegative spondyloarthropathies, with a rapid response to topical steroid treatment. From June 2014 onwards, HLA-B27 testing was performed as a confirmatory test for all these cases as described. We considered the etiology to be HLA-B27-associated anterior uveitis when these compatible clinical features were present with a positive B27 test result in the absence of other etiologies. In this study, all patients with presumed HLA-B27 uveitis (before June 2014) and confirmed HLA-B27 uveitis (after June 2014) will be referred to as HLA-B27 uveitis in our results and discussion.

Aqueous humor sampling for PCR analyses for *herpes simplex* virus (HSV), *varicella zoster* virus (VZV), and *cytomegalovirus* (CMV) DNA was performed for all patients who presented with recurrent anterior uveitis with a raised intraocular pressure, or chronic anterior uveitis with iris atrophy and/or endotheliitis and a reduced corneal endothelial cell density. For patients with a clinical presentation of *Herpes zoster ophthalmicus*, aqueous humor VZV DNA PCR was not performed, as it was considered unnecessary. If the initial aqueous humor PCR result was negative, repeated aqueous humor sampling and PCR testing was performed whenever the uveitis recurred. If repeated aqueous humor PCR testing was negative for HSV, VZV, and CMV, and the clinical features were compatible with a chronic unilateral iridocyclitis or keratouveitis, with iris atrophy and recurrence whenever topical steroid treatment was reduced, a trial of oral acyclovir treatment was prescribed. A diagnosis of presumed herpetic anterior uveitis was made if a good clinical response was observed with the addition of oral antiviral therapy, and/or there were no further recurrences after long-term, suppressive, low-dose acyclovir was prescribed.

A presumptive diagnosis of Posner–Schlossman syndrome (PSS) was made when the PCR result was negative based on the following findings: recurrent episodes of mild iritis associated with elevated IOPs and diffuse epithelial edema of the cornea, and a few fine keratic precipitates (KPs). The IOP was normal in between attacks and the angles were open. Fuchs uveitis syndrome (FUS) was diagnosed when the PCR result was negative if there was chronic, asymptomatic mild inflammation with diffuse characteristic stellate KPs and no posterior synechiae. There may also be diffuse iris atrophy, heterochromia, and vitreous cells.

Aqueous humor sampling for PCR analysis was also performed for all cases with retinitis with a suspected viral etiology. Rheumatoid factor, antinuclear antibodies (ANA), anti-double stranded DNA, anticardiolipin, and anti-neutrophil cytoplasmic antibodies (ANCA), and toxoplasma serology testing were performed for cases with retinal vasculitis. Toxoplasmosis uveitis was done if clinical features of unilateral focal necrotizing retinochoroiditis with or without scar associated with vasculitis, and serology result was positive. Diagnosis of toxocariasis uveitis was done if clinical manifestations of peripheral or posterior granuloma lesions with fibrosis tractional bands came from or to the optic nerve head and vitritis reaction and *Toxocara* serology was positive. Multidisciplinary consultation with rheumatology, infectious disease, pulmonary and neurology specialists was requested when needed. Diagnoses such as Vogt–Koyanagi–Harada (VKH) disease,[9] Behçet disease (BD)[10] ocular sarcoidosis,[11] and acute retinal necrosis (ARN)[12] were made according to the standard diagnostic criteria accepted by uveitis subspecialists. The etiology was described as idiopathic when there was no recognizable ocular entity or identifiable underlying cause.

The extracted database was analyzed using the SPSS software version 20.0 (SPSS, Inc., Chicago, IL). Subjects were arbitrarily analyzed in four age groups: pediatrics (<21 years); young adults (21–40 years); middle-aged (41–60 years); and elderly (>60 years). Descriptive statistics were described as mean and standard deviation (SD) for continuous variables and number and percentage for categorical variables. The differences in proportion for categorical variables were compared using the Pearson χ^2-test, unless specified if Fisher's exact test was used. A statistically significant p value is deemed as <0.05.

RESULTS

A total of 212 patients were newly diagnosed with uveitis at our uveitis clinics between July 2011 to February 2015. A total of 117/212 (55.2%) were male and the majority 157/212 (74.1%) were adults within the working age group (21–60 years). The mean age of the patients was 40.5 ± 17.2 years (range: 6–89 years). Table 1 describes the main demographic and clinical characteristics of the patients at presentation. There was slight male gender predominance but the differences in the gender proportion among the various age groups were not significant (p>0.05).

Anterior uveitis (AU) was the most common presentation in 98/212 (46%), followed by posterior uveitis (PU) in 47/212 (22%), panuveitis in 37/212 (18%), and intermediate uveitis (IU) in 30/212 (14%) of cases. There was no gender association with any particular anatomic subgroup. AU was mostly unilateral (85/98, 87%, p<0.001), while panuveitis was mostly bilateral (33/37, 89%, p<0.001). AU was mainly acute (55/98, 56%, p<0.001), while panuveitis was mostly chronic (34/37, 92%, p<0.001). AU and IU were largely idiopathic, 54/98 (55%) and 20/30 (67%), respectively.

On presentation, 69/212 (33%) of the patients had visual acuity of 20/200 or worse in the eye that was affected by uveitis, while 122/212 (58%) had visual acuity of 20/50 or worse. The complications of uveitis, which were identified among our 212 patients at presentation, included significant posterior subcapsular cataracts in 39 (18%); retinal ischemia in 23 (11%); macular edema in 14 (7%); glaucomatous optic disc changes in 13 (6%); epiretinal membrane in 5 (2%); retinal detachment in 5 (2%); optic atrophy in 4 (2%); and hypotony in 2 (1%). Among those with significant posterior subcapsular cataracts, 35 out of 39 cases (90%) had chronic uveitis (p<0.001), and nine patients underwent cataract surgery during the course of their treatment. Optic neuropathy, macular and retinal ischemia at presentation were significantly associated with those with posterior uveitis and panuveitis, with odds ratio (OR) (95% confidence intervals, CI) of 8.33 (2.32–30.00); 4.19 (1.27–13.84); and 21.00 (4.77–92.40), respectively.

The etiology of the uveitis was determined in 135/212 (64%) of the patients. Table 2 describes the etiologies according to the gender and anatomic location. Among the cases with non-infectious etiology, idiopathic uveitis was the most common diagnosis in 77/212 (36%) patients, followed by VKH (30/212, 14%), and BD (14/212, 7%). The most common infectious cause of uveitis in this study was TB uveitis (19/212, 9%), followed by herpetic AU (12/212, 6%), toxocariasis (12/212, 6%), and CMV anterior uveitis among immunocompetent individuals (9/212, 4%).

Among the patients presenting with anterior uveitis, the most common diagnosis was idiopathic AU (54/98, 55%), followed by herpetic AU (12/98, 12%), PSS (11/98, 11%), and CMV AU (9/98, 9%). Among the patients with posterior uveitis, the most common diagnosis was toxocariasis (12/47, 26%), followed by VKH (10/47, 21%), TB uveitis (8/47, 17%), and BD (6/47, 13%). The top causes for panuveitis were VKH (20/37, 54%), BD (6/37, 16%), and TB uveitis (5/37, 14%). The top diagnoses for intermediate uveitis were idiopathic IU (20/30, 67%), sarcoidosis (4/30, 13%), TB uveitis (3/30, 10%), and BD (2/30, 7%).

A total of 49/212 (23%) patients had granulomatous uveitis. As summarized in Table 3, the top etiologies that caused granulomatous uveitis in our series included toxocariasis (20%), VKH (18%), TB (12%), and sarcoidosis (10%); 34/49 (69%) of our granulomatous uveitis were posterior/panuveitis (p<0.001, Pearson χ^2-test).

Table 4 describes the etiologies according to the age group of patients. Among pediatric patients, idiopathic AU was the most common diagnosis, followed

TABLE 1. Demographic and clinical characteristics at presentation.

	Total (n = 212)		Anterior (n = 98)		Intermediate (n = 30)		Posterior (n = 47)		Panuveitis (n = 37)	
Location	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Gender										
Male	117	55	53	54	20	67	26	55	18	49
Female	95	45	45	46	10	33	21	45	19	51
p value			0.76		0.17		0.98		0.38	
Age group (years)										
0–20	28	13	8	8	6	20	12	26	2	5
21–40	84	40	39	40	8	27	19	40	18	49
41–60	73	34	37	38	12	40	12	26	12	32
>60	27	13	14	14	4	13	4	9	5	14
Laterality										
Unilateral	130	61	85	87	15	50	26	55	4	11
Bilateral	82	39	13	13	15	50	21	45	33	89
p value			<0.001*		0.17		0.34		<0.001†	
Chronicity										
Acute	83	39	55	56	10	33	15	32	3	8
Chronic	129	61	43	44	20	67	32	68	34	92
p value			<0.001*		0.48		0.25		<0.001†	
Etiology										
Infectious	58	27	24	24	4	13	23	49	7	19
Non-infectious	154	73	74	76	26	87	24	51	30	81
Idiopathic	77	36	54	55	20	67	2	4	1	3
Visual acuity										
VA better than 20/50	90	42	62	63	14	47	9	19	5	13
VA 20/50 or worse	122	58	36	37	16	53	38	81	32	87
p value			<0.001*		0.61		<0.001*		<0.001†	
VA 20/200 or worse	69	33	14	14	5	17	28	60	22	60
VA CF	32	15	6	6	2	7	11	23	13	35
VA HM	21	10	8	8	1	3	10	21	2	5
PL	3	1	1	1	1	3	0	0	1	3
NPL	6	3	1	1	0	0	3	6	2	5

*p<0.05, Pearson χ^2-test; †p<0.05, Fisher's exact test.

by toxocariasis, idiopathic IU, and TB uveitis. Among elderly patients, idiopathic AU was the most common, followed by VKH, idiopathic IU, sympathetic ophthalmia, and herpetic AU. Toxocariasis mainly affected younger patients (11/12, 92%, were ≤40 years).

DISCUSSION

Epidemiologic studies can provide an important insight into the region-specific presentations of the various uveitic conditions, and these are essential for clinicians in their consideration of the differential diagnoses in their clinical practice.[5] For example, in Japan, changes in the environment and lifestyle of their population led to a decrease in the incidence and prevalence of BD over time.[6] Therefore, an updated epidemiologic database of various uveitic conditions is important for each population. In our study, we observed that uveitis predominantly affected individuals within the 20–60-year age group (74.1%), with a mean age of 40.5 ± 17.2 years (range: 6–89 years). This is similar to other studies.[5,6,13,14] 13,14 Children who were below 16 years of age and the elderly who were above 60 years of age (5–16% and 6–21% of various cohorts, respectively) were less frequently affected by uveitis.[5]

In our study, anterior uveitis was most common (46%), followed by posterior uveitis (22%), panuveitis (18%), and intermediate uveitis (14%), and this distribution was similar to that of other reported studies.[5,6,13–17] In general, we observed a predominance of unilateral uveitis (130/212, 61%) over bilateral uveitis (82/212, 39%), and this was similar to other series.[5,14,16,17] Anterior uveitis was predominantly unilateral and acute, while panuveitis was predominantly bilateral and chronic. A definitive or presumed specific diagnosis was determined in 135/212 (64%) of the patients based on a careful history and clinical examination with relevant laboratory tests. The percentage of idiopathic uveitis in our series was 36%, and that was comparable with other reports.[18]

Most patients with anterior uveitis had good visual acuity (62/98, 63%, p<0.001), while a greater proportion of patients with posterior uveitis or panuveitis had a visual acuity of 20/50 or worse (81% and 87%, respectively, p<0.001), which might be related to their association with complications, such as optic

TABLE 2. Etiologies according to gender and anatomic location.

	Total (n = 212)		Male (n = 117)		Female (n = 95)		Anterior (n = 98)		Intermediate (n = 30)		Posterior (n = 47)		Panuveitis (n = 37)	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Idiopathic	77	36.3	45	38.5	32	33.7	54	55.1	20	66.7	2	4.3	1	2.7
VKH	30	14.2	18	15.4	12	12.6					10	21.3	20	54.1
TB	19	9.0	11	9.4	8	8.4	3	3.1	3	10.0	8	17.0	5	13.5
Behçet disease	14	6.6	8	6.8	6	6.3			2	6.7	6	12.8	6	16.2
Herpetic anterior uveitis	12	5.7	4	3.4	8	8.4	12	12.2						
Toxocariasis	12	5.7	6	5.1	6	6.3					12	25.5		
PSS	11	5.2	6	5.1	5	5.3	11	11.2						
CMV anterior uveitis	9	4.2	3	2.6	6	6.3	9	9.2						
Sarcoidosis	7	3.3	5	4.3	2	2.1			4	13.3	2	4.3	1	2.7
Sympathetic ophthalmia	6	2.8	4	3.4	2	2.1					4	8.5	2	5.4
Fuchs uveitis syndrome	4	1.9	3	2.6	1	1.1	4	4.1						
HLA-B27	4	1.9	2	1.7	2	2.1	4	4.1						
Cysticercosis	2	0.9			2	2.1					2	4.3		
Herpetic retinitis	1	0.5			1	1.1							1	2.7
JIA	1	0.5	1	0.9			1	1.0						
Fungal endogenous endophthalmitis	1	0.5	1	0.9									1	2.7
Syphilis	1	0.5			1	1.1			1	3.3				
Toxoplasmosis	1	0.5			1	1.1					1	2.1		

VKH, Vogt–Koyanagi–Harada disease; TB, tuberculosis; PSS, Posner–Schlossman syndrome; CMV, cytomegalovirus; HLA, human leukocyte antigen; JIA, juvenile idiopathic arthritis.

TABLE 3. Etiologies of granulomatous uveitis.

	Patients (n = 49)	
Etiologies	n	(%)
Toxocariasis	10	20.4
VKH	9	18.4
TB	6	12.2
Sarcoidosis	5	10.2
Idiopathic anterior uveitis	5	10.2
Idiopathic intermediate uveitis	3	6.1
CMV anterior uveitis	2	4.1
Herpetic anterior uveitis	2	4.1
Cysticercosis	2	4.1
Idiopathic panuveitis	1	2.0
Idiopathic posterior uveitis	1	2.0
Fungal uveitis	1	2.0
Toxoplasmosis	1	2.0
Sympathetic ophthalmia	1	2.0

VKH, Vogt–Koyanagi–Harada disease; TB, tuberculosis; CMV, cytomegalovirus.

neuropathy, macular, and retinal ischemia. Patients with chronic uveitis were also associated with significant posterior subcapsular cataracts.

We observed a greater proportion of granulomatous uveitis (23%) among our patients, compared with that of other reports (10–15%).[5,14,16] The most common causes varied between different countries.[5] In developed countries, the causes were sarcoidosis (0.5–18.1%), VKH (0.4–10%), and sympathetic ophthalmia (0.2–3.8%). On the contrary, in developing countries, the causes were TB (0.2–30%) and leprosy (0.2–1.2%). The most common causes of granulomatous uveitis in our study were toxocariasis (20%), VKH (18%), TB (12%), and sarcoidosis (10%).

The etiology of uveitis remained idiopathic in up to 35–45% of cases in many series,[5,6,13–17] and our observed overall proportion was comparable (77/212, 36%). In our study, anterior and intermediate uveitis were more commonly idiopathic (54/98, 55% and 20/30, 67%, respectively) compared with posterior and panuveitis. This is similar to the reported trend in other series.

In a review on the global uveitis variation by Rathinam and Namperumalsamy,[5] infectious uveitis have been reported to be uncommon among developed countries, and their causes are predominantly toxoplasmosis, followed by herpetic anterior uveitis and necrotizing herpetic retinitis. Tuberculosis and syphilis were reported as rare among developed countries, with a proportion of <3% of cases. In developing countries, infectious uveitis have been reported to be more common (11.9–50% of cases), and these include onchocerciasis, toxoplasmosis, herpetic uveitis, TB, leprosy, leptospirosis, and other parasitic diseases. Our proportion of infectious uveitis (27%)

TABLE 4. Etiologies according to age group.

≤20 (n = 28)	n	(%)	21–40 (n = 84)	n	(%)	41–60 (n = 73)	n	(%)	>60 (n = 27)	n	(%)
Idiopathic anterior uveitis	7	25.0	Idiopathic anterior uveitis	23	27.4	Idiopathic anterior uveitis	16	21.9	Idiopathic anterior uveitis	8	29.6
Toxocariasis	6	21.4	VKH	13	15.5	VKH	12	16.4	VKH	4	14.8
Idiopathic intermediate uveitis	5	17.9	TB	11	13.1	Idiopathic intermediate uveitis	9	12.3	Idiopathic intermediate uveitis	3	11.1
TB	4	14.3	Behçet disease	10	11.9	PSS	6	8.2	Sympathetic ophthalmia	3	11.1
Sarcoidosis	3	10.7	CMV anterior uveitis	5	6.0	Herpetic anterior uveitis	5	6.8	Herpetic anterior uveitis	2	7.4
VKH	1	3.6	Herpetic anterior uveitis	5	6.0	Behcet disease	4	5.5	PSS	2	7.4
Herpetic retinitis	1	3.6	Toxocariasis	5	6.0	TB	3	4.1	Sarcoidosis	1	3.7
JIA	1	3.6	Idiopathic intermediate uveitis	3	3.6	CMV anterior uveitis	3	4.1	TB	1	3.7
			PSS	3	3.6	Fuchs uveitis syndrome	3	4.1	CMV anterior uveitis	1	3.7
			HLA-B27	2	2.4	Sarcoidosis	2	2.7	Idiopathic panuveitis	1	3.7
			Sarcoidosis	1	1.2	Cysticercosis	2	2.7	Fuchs uveitis syndrome	1	3.7
			Idiopathic posterior uveitis	1	1.2	HLA-B27	2	2.7			
			Fungal endogenous endophthalmitis	1	1.2	Sympathetic ophthalmia	2	2.7			
			Sympathetic ophthalmia	1	1.2	Idiopathic posterior uveitis	1	1.4			
						Syphilis	1	1.4			
						Toxocariasis	1	1.4			
						Toxoplasmosis	1	1.4			

VKH, Vogt–Koyanagi–Harada disease; TB, tuberculosis; PSS, Posner–Schlossman syndrome; CMV, cytomegalovirus; HLA, human leukocyte antigen; JIA, juvenile idiopathic arthritis.

was comparable with that of southern India (30.5%),[5] northern Africa (29%),[16] and Iran (23.2%).[14] Surprisingly, toxoplasmosis was less commonly encountered in our series (1/212, 0.5%), but this may have resulted from a potential referral bias if some of these posterior uveitis were handled instead by other retinal departments. Toxocariasis was more common, and that might be related to the agricultural activities of patients in the rural areas. All the cases of toxocariasis were acquired from 14 up to 45 years old, and without any systemic features. CMV anterior uveitis among immunocompetent patients is a uveitic entity that is being increasingly recognized, especially among Asian populations.[19] In our series, it accounted for 4% of the cases. Non-infectious uveitis have been reported to be more common among developed countries,[5] and these include seronegative spondyloarthropathies-associated uveitis, sarcoidosis, and BD. VKH has been reported to be more common in Japan (6.7–10.1%)[6,20] and less common in Europe and the Middle East (1.2–2.9%).[13] In our series, VKH is the top known non-infectious etiology (30/212, 14%) followed by BD (14/212, 7%).

Limitations of our series include its retrospective design and the limited accessibility to newer diagnostic investigations due to the nature of the practice in community-based ophthalmic hospitals. There are also inherent limitations in the extrapolation of incidence and prevalence data of various uveitic entities to the population. Nevertheless, our study establishes a region-specific list of differential diagnoses, which may help clinicians in their approach to reaching a specific diagnosis and their considerations of targeted clinical investigations when managing a Vietnamese with uveitis.

In conclusion, TB, toxocariasis and herpetic infections were the most common causes of infectious uveitis in southern Vietnam, whereas VKH, BD, and ocular sarcoidosis were the most common autoimmune entities. Further studies are needed to add to our observations, in order to increase our understanding of the epidemiology of uveitis in the Asia-Pacific region.

DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

REFERENCES

1. Gritz DC, Wong IG. Incidence and prevalence of uveitis in Northern California; the Northern California Epidemiology of Uveitis Study. *Ophthalmology*. 2004;111:491–500; discussion.
2. Durrani OM, Tehrani NN, Marr JE, et al. Degree, duration, and causes of visual loss in uveitis. *Br J Ophthalmol*. 2004;88:1159–1162.
3. Chu DS, Johnson SJ, Mallya UG, et al. Healthcare costs and utilization for privately insured patients treated for non-infectious uveitis in the USA. *J Ophthalmic Inflamm Infect*. 2013;3:64.
4. Weiner A, BenEzra D. Clinical patterns and associated conditions in chronic uveitis. *Am J Ophthalmol*. 1991;112:151–158.
5. Rathinam SR, Namperumalsamy P. Global variation and pattern changes in epidemiology of uveitis. *Indian J Ophthalmol*. 2007;55:173–183.
6. Wakabayashi T, Morimura Y, Miyamoto Y, et al. Changing patterns of intraocular inflammatory disease in Japan. *Ocul Immunol Inflamm*. 2003;11:277–286.
7. Jabs DA, Nussenblatt RB, Rosenbaum JT; Standardization of Uveitis Nomenclature Working G. Standardization of uveitis nomenclature for reporting clinical data. Results of the First International Workshop. *Am J Ophthalmol*. 2005;140:509–516.
8. Ang M, Hedayatfar A, Wong W, et al. Duration of anti-tubercular therapy in uveitis associated with latent tuberculosis: a case-control study. *Br J Ophthalmol*. 2012;96:332–336.
9. Read RW, Holland GN, Rao NA, et al. Revised diagnostic criteria for Vogt–Koyanagi–Harada disease: report of an international committee on nomenclature. *Am J Ophthalmol*. 2001;131:647–652.
10. Kurokawa MS, Yoshikawa H, N. Suzuki Behcet's disease. *Semin Respir Crit Care Med*. 2004;25:557–568.
11. Herbort CP, Rao NA, Mochizuki M; members of Scientific Committee of First International Workshop on Ocular S. International criteria for the diagnosis of ocular sarcoidosis: results of the first International Workshop on Ocular Sarcoidosis (IWOS). *Ocul Immunol Inflamm*. 2009;17:160–169.
12. Holland GN. Standard diagnostic criteria for the acute retinal necrosis syndrome. Executive Committee of the American Uveitis Society. *Am J Ophthalmol*. 1994;117:663–667.
13. Nashtaei EM, Soheilian M, Herbort CP, et al. Patterns of uveitis in the Middle East and Europe. *J Ophthalmic Vis Res*. 2011;6:233–240.
14. Rahimi M, Mirmansouri G. Patterns of uveitis at a tertiary referral center in southern Iran. *J Ophthalmic Vis Res*. 2014;9:54–59.
15. Singh R, Gupta V, Gupta A. Pattern of uveitis in a referral eye clinic in north India. *Indian J Ophthalmol*. 2004;52:121–125.
16. Khairallah M, Yahia SB, Ladjimi A, et al. Pattern of uveitis in a referral centre in Tunisia, North Africa. *Eye (Lond)*. 2007;21:33–39.
17. Bajwa A, Osmanzada D, Osmanzada S, et al. Epidemiology of uveitis in the mid-Atlantic United States. *Clin Ophthalmol*. 2015;9:889–901.
18. Abdulaal M, Antonios R, Barikian A, et al. Etiology and clinical features of ocular inflammatory diseases in a tertiary center in Lebanon. *Ocul Immunol Inflamm*. DOI: 10.3109/09273948.2014.902077.
19. Chee SP, Bacsal K, Jap A, et al. Clinical features of cytomegalovirus anterior uveitis in immunocompetent patients. *Am J Ophthalmol*. 2008;145:834–840.
20. Goto H, Mochizuki M, Yamaki K, et al. Epidemiological survey of intraocular inflammation in Japan. *Jpn J Ophthalmol*. 2007;51:41–44.