RETROSPECTIVE STUDY ON THE PREVALENCE OF UVEITIS IN DOGS

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ABSTRACT

The present retrospective study was performed to establish the prevalence of uveitis in dogs, the effects of breed, age, gender and etiology as predisposing factors. The survey comprised 329 dogs with ophthalmic diseases referred to the Small Animal Clinic at the Faculty of Veterinary Medicine – Stara Zagora over a 7-year period. The presence of statistically significant relationship between morbidity and canine breed, age and gender was evaluated by means of univariate logistic regression analysis. The share of uveitis from all ophthalmic diseases in dogs was 24.9%. The most commonly affected with ophthalmic conditions were Pekingeses (9.73%), Shar-Pei (9.12%), mongrels (8.21%) and German Shepherds (7.06%), whereas uveitis was most commonly diagnosed in Bologneses (75%), Huskies (66.67%), Drathaars (62.5%) and Boxers (50%). Bologneses were 7.67 times more prone to uveitis than the other studied breeds, while the odds of Huskies to develop the disorder were 5.11 higher. Dogs older than 7 years of age were affected 6 times more often while middle-aged – 4.4 times more often than young animals. Most frequently, uveitis in dogs was caused by cataract.

Key words: *uveitis, dog, breed, age, etiology*

Introduction

Canine uveitis is a debilitating, painful inflammation disease that could threaten the vision and is among the commonest disorders in this species (Gwinn, 1988). It is characterised with photophobia, blepharospasm, tearing, conjunctival swelling and reddening, Tyndall effect, hyphema or hypopion, corneal precipitates, hyperemia and swelling of the iris, miosis, reduced intraocular pressure, retinal edema or detachment (Townsend, 2008). The consequences of uveitis are severe and usually consist in cataract, posterior synechiae, secondary glaucoma, retinal degeneration and loss of vision (Maggio and Parry, 2007).

The etiological factors could be: non-infections (idiopathic, trauma, lens-induced, pigmentary, uveodermatological, neoplastic) and infections (leptospirosis, brucellosis, mycosis, transmissive infections) (Townsend, 2008). Golden retrievers are reported to be susceptible to pigmentary uveitis (Sapienza et al., 2000), whereas uveodermatological syndrome was immunogenetically related to Akita, Samoed, Siberian Husky and Shetland shepherds at about 2.8 years of age (Morgan, 1989). Uveitis should be differentiated from other ocular illnesses accompanied with pain and poor vision as conjunctivitis, keratitis, glaucoma, retinal degeneration, which require a different therapeutic approach (Maggio and Parry, 2007).

So far, no investigation on the features of the disease and its relationship to breed, age and sex have been performed at a national scale. The purpose of the present survey was to establish the morbidity rate, etiology and breed-, age- and sex predilection in canine patients brought to the Small Animal Clinic at the Faculty of Veterinary Medicine – Stara Zagora, over a 7-year period.

Material and methods

The survey comprised all dogs with ophthalmic diseases brought to the Small Animal Clinic at the Faculty of Veterinary Medicine – Stara Zagora between 1 January 2007 and 31 December 2013. Individual patient records were used for information. All dogs were submitted to routine ophthalmological exam including inspection, palpation, slip lamp illumination and biomicroscopy (Led Slit Lamp-XL1, Japan), fluorescein dye test (Fluorescein paper, Haag-Streit Int., Switzerland), Schirmer test (Schirmer Strips, Eickemeyer®, Germany) and indirect ophthalmoscopy with ophthalmoscope (GR-OPH2100, Germany) after pupil dilation with phenylephrine hydrochloride

(Mydfrin® 2.5%, Alcon Inc., USA). Dogs with systemic disease and ophthalmic pathology signs, were submitted to routine CBC and blood biochemistry analysis, and serological test for Ehrlichia canis antibodies (SNAP 4Dx Plus, Idexx Laboratories, USA). When a neoplastic process was suspected, fine needle biopsy and cytology for confirmation of tumour cells in ocular media were done.

The association of uveitis occurrence and the breed, age and sex of patients was tested by univariate logistic regression analysis.

Results

The retrospective study of patients' records showed that over the 7-year survey period, 329 dogs with ophthalmic diseases were brought tot he clinic. Out of them 82 (24.9%) were diagnosed with uveitis. The breed distribution is shown in Table 1. The most numerous were Pekingeses - 32 (9.73%) dogs, 9 of them (28.13%) affected with uveitis. Other breeds commonly affected with ophthalmic diseases are Shar-Pei (9.12%), mixed breed dogs (8.21%), German shepherd (7.06%) and Cocker Spaniel (6.14%). Uveitis was the most frequent ophthalmic diseases in Bologneses (75%), Drathaars (62.5%), Boxers (50%) and Labradors (40%). A very uveitis high morbidity rate (100%) was found out in Kurzhaars, Baraks, Beagles and Dogues, but their share in the entire cohort of patients was very low (< 1%).

Young animals (0-3 years of age) were most commonly affected with ophthalmic diseases – 58.97% (Table 2). The prevalence of uveitis within this age group (0-3 years) was significantly lower than among middle-aged (4-7 years) and senior dogs (>7 years). Uveitis was diagnoses in 48.07% of adult dogs with ophthalmic diseases. Gender had no effect on uveitis occurrence.

According to the results from the univariate logistic regression analysis, both breed ($p=0.004$) and age ($p<0.0001$) were closely associated with uveitis (Table 3). Bologneses ($p=0.02$) and Huskies ($p=0.04$) were most susceptible to develop the disease. Middle-aged dogs were at a 4.37 times higher risk to develop uveitis than young dogs, whereas in senior patients, the risk was 6 times higher ($p < 0.001$).

Observed clinical signs and their frequency are presented in Table 4. In most cases, both eyes were affected (38/82 dogs, 46.34%). Leading clinical signs were positive Tyndall effect (56.09%), reddening of the conjunctiva (51.22%), miosis (47.56%) loss of vision (46.34%). The distribution according to the etiology showed the biggest proportion of phacolytic uveitis (35 dogs or 42.68%) - Table. Idiopathic uveitis was also frequently seen (39.02%).

Discussion

Uveitis is one of the most frequent ophthalmic diseases in dogs and one of the most important causes for blindness (Massa et al., 2002). It could range from mild, asymptomatic condition to very painful disease resulting in permanent blindness (Trbolová, 2011). In our survey 24.9% of studied ophthalmic dog patients were diagnosed with uveitis.

The occurrence of the disease varied within a rather broad range. Komnenou et al. (2007) reported 100% clinical manifestation of uveitis in dogs with ehrlichiosis, while in other reports, the prevalence of uveitis varied from 6.5% to 21% (Kuehn and Gaunt, 1985; Frank and Breitschwerdt, 1999; Mylonakis et al., 2004). In our survey ehrlichiosis was responsible for 10.98% of uveitis cases. The retrospective study of Komnenou et al. (2007) on canine monocytic ehrlichiosis establishes that 75.5% of patients were with bilateral uveitis manifested a long time (20-30 days) before the other signs of disease. In ehrlichiosis, the signs from the part of the anterior eye segment were predominating – corneal oedema, reddening of the conjunctivae, miosis, hypotonia, Tyndall effect, hyphema, iris hyperpigmentation. Also, in 30 out of 90 dogs (33.3%) the only symptoms were the specific signs of uveitis.

Table 1. Breed distribution of studied dogs.

Breed	Number of ophthalmic patients (n=329)	%*	Number of patients with uveitis (n=82)	%**	%***
Pekingese	32/329	9.73	9/82	10.98	28.13
Shar-pei	30/329	9.12	3/82	3.66	10.00
Mixed breed	27/329	8.21	6/82	7.32	22.22
German shepherd	23/329	7.06	4/82	4.88	17.39
Cocker spaniel	20/329	6.14	8/82	9.76	40.00
Chow-chow	18/329	5.53	2/82	2.44	11.11
French bulldog	14/329	4.30	1/82	1.22	7.14
English bulldog	13/329	3.99	–	–	–
Pug	12/329	3.68	2/82	2.44	16.67
Rottweiler	11/329	3.38	2/82	2.44	18.18
Miniature Pinscher	10/329	3.07	4/82	4.88	40.00
Pointer	9/329	2.76	2/82	2.44	22.22
Husky	9/329	2.76	6/82	7.32	66.67
Rather	8/329	2.46	5/82	6.10	62.50
Bolognese	8/329	2.46	6/82	7.32	75.00
Yorkshire terrier	8/329	2.46	2/82	2.44	25.00
Caucasian shepherd	7/329	2.15	1/82	1.22	14.29
Bulgarian shepherd dog	7/329	2.15	1/82	1.22	14.29
Spitz	6/329	1.84	–	–	–
Golden retriever	6/329	1.84	2/82	2.44	33.33
Scenthound	6/329	1.84	2/82	2.44	33.33
Saint Bernard	6/329	1.84	–	–	–
Labrador	5/329	1.53	2/82	2.44	40.00
Neapolitan mastiff	5/329	1.53	–	–	–
Boxer	4/329	1.23	2/82	2.44	50.00
Pitbull	4/329	1.23	1/82	1.22	25.00
Others breed <1%:	21/329	5.71	9/82	10.98	42.86
- Kurzhaar	3/329	0.91	3/82	3.66	100.00
- Barak	2/329	0.61	2/82	2.44	100.00
- Staffordshire	3/329	0.91	1/82	1.22	33.33
- Beagle	1/329	0.30	1/82	1.22	100.00
- Chihuahua	3/329	0.91	1/82	1.22	33.33
- Dogue	1/329	0.30	1/82	1.22	100.00
- Poodle	1/329	0.30	–	–	–
- Cane Corso	3/329	0.91	–	–	–
- Malinois	1/329	0.30	–	–	–
- Irish setter	1/329	0.30	–	–	–
- Chinese crested dog	1/329	0.30	–	–	–
- Samoyed	1/329	0.30	–	–	–

* % from the total number of ophthalmic patients; ** % from the total number of uveitis patients; *** % from the total number of uveitis patients within a given breed

Table 2. Age and gender distribution of studied dogs

	Number of ophthalmic patients (n=329)	%*	Number of patients with uveitis (n=82)	%**	%***
Age					
0-3 years	194/329	58.97	25/82	30.48	12.89
4-7 years	83/329	25.23	32/82	39.04	39.02
> 7 years.	52/329	15.80	25/82	30.48	48.07
Gender					
Male	178/329	54.10	49/82	59.76	27.53
Female	151/329	45.90	33/82	40.24	21.86

* % from the total number of ophthalmic patients; ** % from the total number of uveitis patients; *** % from the total number of uveitis patients within a given group

Table 3. Univariate logistic regression analysis of studied parameters in relation to canine uveitis – results from survey of 329 dogs with ophthalmic diseases

Parameter	odds ratio (OR)	OR (95% confidence interval)	P
Breed p=0.004			
Pekingese	–	–	–
Shar-pei	0.2738	0.0663 - 1.1309	0.07
Mixed breed	0.7302	0.2220 - 2.4011	0.60
German shepherd	0.5380	0.1430 - 2.0247	0.36
Cocker spaniel	1.7037	0.5231 - 5.5487	0.38
Chow-chow	0.3007	0.0574 - 1.5741	0.15
French bulldog	0.1966	0.0223 - 1.7305	0.14
Pug	0.5111	0.0931 - 2.8051	0.44
Rottweiler	0.5679	0.1022 - 3.1559	0.52
Miniature Pinscher	1.7037	0.3873 - 7.4947	0.48
Pointer	0.7302	0.1268 - 4.2029	0.72
Husky	**5.1111**	**1.0467 - 24.9578**	**0.04**
Drathaar	4.2593	0.8382 - 21.6443	0.08
Bolognese	**7.6667**	**1.2978 - 45.2905**	**0.02**
Yorkshire terrier	5.1111	0.4108 - 63.5980	0.20
Caucasian shepherd	0.4259	0.0448 - 4.0530	0.46
Bulgarian shepherd dog	0.3651	0.0392 - 3.4039	0.37
Golden retriever	1.2778	0.1981 - 8.2423	0.79
Scenthound	1.2778	0.1981 - 8.2423	0.79
Labrador	1.7037	0.2428 - 11.9524	0.59
Boxer	2.5556	0.3111 - 20.9959	0.38
Pitbull	0.8519	0.0780 - 9.3043	0.89
Age p<0.0001			
0-3 years	–	–	–
4-7 years	**4.3741**	**2.3844 - 8.0241**	**P < 0.001**
> 7 years	**6.0089**	**3.0082 - 12.0030**	**P < 0.001**
Gender p=0.29			
Male	–	–	–
Female	0.7363	0.4434 - 1.2225	0.24

Table 4. Distribution of observed clinical signs in dogs with uveitis (* % from the total number of uveitis patients)

Ophthalmic status of diseased dogs (n=82)	**Number**	**%***
Affected left eye	18	21.95
Affected right eye	26	31.71
Both eyes affected	38	46.34
Vision loss	38	46.34
Loss of pupil reflex	38	46.34
Photophobia	30	36.59
Corneal oedema	28	34.15
Cell infiltrates	10	12.20
Diffuse cataract	30	36.59
Surface vascularization	21	25.61
Iris depigmentation	12	14.63
Miosis	39	47.56
Posterior synechia	9	10.98
Deep vascularization	25	30.49
Iris atrophy	6	7.32
Positive Tyndall effect	43	56.09
Excessive tearing	11	13.41
Blepharospasm	32	39.02
Reddening of conjunctivas	42	51.22
Eyelid swelling	28	34.15
Anterior synechia	6	7.32
Local cataract	8	9.76
Purulent eye discharge	18	21.95
Positive fluorescein dye test	16	19.51
Hyphema	18	21.95
Iris oedema	14	17.07
Retinal detachment	5	6.10
Retinal degeneration	3	3.66

Table 5. Distribution of dogs with uveitis (n=82) according to the etiology of the disease

Etiological factor	Number	%*
Trauma	5	6.10
Idiopathic	32	39.02
Ehrlichiosis	9	10.98
Phacolytic	35	42.68
Lymphosarcoma	1	1.22

* % from the total number of uveitis patients

In our study, tests for seropositivity to E. canis were done only when other systemic signs were present, which was probably responsible for the lower percentage of dogs with uveitis due to ehrlichiosis. The mechanisms of uveal tract inflammation in E. canis infection were not completely understood, but could include immune-mediated vasculitis with impairment of blood-aqueous barrier, tendency to bleeding due to thrombocytopenia or monoclonal gammopathy (Harrus et al., 1998; Martin, 1999; Harrus et al., 2001; Panciera et al., 2001).

In the study of Massa et al. (2002), 17.6% of cases with proven canine infectious uveitis were due to E. canis (7 out of 18). As confirmed in this survey, the share of immune-mediated/idiopathic uveitis was considerably higher. There was no systemic cause in 39.02% of canine uveitis cases and they were categorised as idiopathic. A similar proportion (58%) was reported by Massa et al. (2002) in 102 cases of uveitis. According to the generally accepted classification, this category comprises all cases without evidence for infectious agent, trauma or neoplasm.

The most prevalent etiological factor was phacolytic uveitis (42.68%). It was reported in 71% of dogs with cataract (Paulsen et al., 1986). According to Park et al. (2009) lens-induced uveitis is the most frequent complication of cataract. The tendency for development of phacolytic uveitis increases with progression of cataract and its maturity stage. It is due to the atypically low tolerance of T-lymphocytes to lens proteins (Townsend, 2008).

Lymphosarcoma is the commonest tumour causing uveitis (Massa et al., 2002) - 68% of ocular neoplasms. In our study it was the only detected neoplastic process – 1.22%, resulting in uveal tract inflammation. All cases of ocular lymphosarcoma are accompanied with systemic signs as generalised lymphadenopathy, spleno- and hepatomegaly, gastrointestinal disorders etc., which is in agreement with our observations.

The leading clinical sign was the positive Tyndall effect in 43 (56.9%) dogs. It is due to the increased concentration of light scattering proteins in the chamber fluid due to impaired blood-ocular barriers (Caprioli, 1992). This is a specific sign of uveitis reported in 86% of digs with this disease (Massa et al., 2002). According to the same authors, corneal oedema was encountered in 65% of studied animals, while in our study the sign was encountered in 28 (34%) dogs. Having studied the ocular signs of ehrlichiosis, the authors demonstrated corneal oedema in 83% and positive Tyndall effect in 12% of studied patients (Komnenou et al., 2007).

In 18 dogs (21.95%) the left eye was affected; in 26 (31.71%) – the right eye, whereas 38 dogs (46.34%) had bilateral uveitis. The reports of other researchers are comparable. Massa et al. (2002) observed bilateral uveitis in 57% of dogs, 21% with left and 23% with right eye affected, with statistically significant relationship between unilateral uveitis with idiopathic etiology compared to infectious or neoplastic cause. Others reported bilateral uveitis in 75% of cases vs 25% unilateral disease (Komnenou et al., 2007), but no significant correlation between the prevalence of uveitis and the breed, age or gender of patients.

The breed predisposition to uveitis is related to several autoimmune syndromes as pigmentary uveitis in Golden retriever (Townsend and Gornik, 2013) and uveodermatological syndrome in Akita, Siberian Husky etc. (Townsend, 2008). Pigmentary uveitis affected 5.5% of Golden retrievers and is characterised with specific pigment depositions on the anterior lens capsule, often radial and with or without iris cysts (Sapienza et al., 2000). The uveodermatological syndrome is similar to the Vogt-Koyanagi-Harada syndrome in humans and affects northern dog breeds. Apart

as chronic anterior uveitis, it occurs with depigmentation and ulceration of skin areas mainly on the face. Melanocytes are the target cells of the destructive autoimmune cell response (Pye, 2009). In our study, no such cases were found out and the breed distribution of affected dogs was different. The breeds most commonly affected with uveitis were Bolognese, Drathaar, Boxer and Labrador. This distribution in our view depends mostly on the representativeness of a breed in a given country, hence the substantial differences in the affected breeds reported by different investigators of canine uveitis.

As age was concerned, animals older than 7 years of age were affected 6 times more frequently with uveitis. This corresponds to other reported data stating an average age of 6.1 years in uveitis dog patients (Massa et al., 2002).

On the basis of our survey, the following conclusions could be made: 1) Uveitis occupies a large share of ocular diseases in dogs (24.9%); 2) The breeds most commonly affected with ophthalmic diseases are: Pekingese (9.73%), Shar-Pei (9.12%), mixed-breed (8.21%) and German shepherd (7.06%); 3) The breeds in which uveitis constitutes the greatest share among all ophthalmic diseases are Bolognese (75%), Husky (66.67%), Drathaar (62.50%) and Boxer (50%); 4) A statistically significant relationship was proven between uveitis occurrence and patient's age and breed. Bologneses were 7.67 times more susceptible than other breeds, and Huskies - 5.11 times more prone to uveitis. Dogs above 7 years of age suffer 6 times more often from uveitis vs other age groups; 5) The commonest clinical signs in association with uveitis are: Tyndall effect (56.09%), reddening of the conjunctiva (51.22%) and miosis (47.56%). The diseases results in loss of vision in 46.34% of studied dogs; 6) Phacolysis was the leading etiology of uveitis in the dogs; 7) In dogs with bilateral uveitis, serological tests for Ehrlichia canis infection is strongly recommended.

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