

Ocular Tear Film Stability in Extra Ocular Diseases of Dogs

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Corneal health, integrity and its optical function depends on the stability of the precorneal tearfilm which is considered as the outermost physiological layer of the cornea. The three layers of the precorneal tear film are outer oily layer, middle aqueous layer and inner mucin layer. The integrity of these layers during various extra ocular diseases conditions have been affected. Assessing and differentiating the productivity and stability of these layers to arrive at an early diagnosis of extra ocular diseases conditions. The stability of oily layer, aqueous and mucin layers were assessed by Tear break up time, Schirmer tear test and Impression cytology respectively (Lim and Cullen, 2005). This will aid the way for proper selection of various topical agents including tear fluid substitutes, tear film modulating agents with antibiotic drugs. (Davidson and Kuonen , 2004)

Materials and Methods

The study was conducted on dogs that are presented to Small Animal Ophthalmology Unit, Madras Veterinary College Teaching Hospital with a history of extra ocular diseases (n=28) and the normal dogs (28) were taken for the study. The cases were subjected to basic ophthalmic examination.

The basic ophthalmological investigations viz., menace response, papillary light reflex and corneal reflex were carried out in both extra ocular diseases and normal eye. Based on the clinical signs the extraocular diseases were diagnosed as blepharitis, scleritis, conjunctivitis, corneal ulcer (Fig.1), corneal opacity and keratoconjunctivitis sicca (Fig2).



Fig. 1. Corneal ulcer



Fig.2.Keratoconjunctivitis sicca

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The tear film stability evaluated with schirmer tear test and tear break up time in all the cases. In addition to this impression cytology also done in corneal ulcer cases.

Schirmer tear test (STT)

The STT was performed by placing the standardized test strip within the ventral conjunctival sac of each eye. Using a stopwatch to ensure a 60-s time lapse, tear production was recorded in mm/min for eye.

Tearfilm break up time

Tearfilm break up time were measured after schirmer tear test were performed. Tearfilm break up time were measured within 2 to 5 min of STT. A fluorescein dye strips (fig.3) were moistened with eye washes and applied to the dorsolateral bulbar conjunctiva. The eyelids were then closed. After opening the eyelids, the dorsolateral corneal surface was observed through the cobalt at 16x magnification. Tear film break up time was measured as the time from eyelid opening to the first signs of tear break –up, seen as the appearance of a dark area within the yellow - green fluorescent tear film (fig.4). A stop watch was used to ensure accurate time measurement. The examination will be done by indirect ophthalmoscopy.



Fig.3 Corneal ulcer stained with dye



Fig.4 Fluorescein dye test

Corneal impression cytology

Corneal cytology was performed for diagnosing corneal ulcers by using corneal impression smears for diagnosing corneal ulcers.

In extraocular diseased cases and also in normal cases both right eye (OD) and left eye (OS) were tested for tear stability to find out the relationship between the ocular surface tests and correlation between the normal and diseased eye within the individual and between the individual.

Result and discussion

A total of 28 dogs of different breeds were evaluated for tear film stability tests were evaluated in 28 dogs of different breeds with extra ocular eye diseases and 28 dogs of different breeds with normal eye condition.

Table-1 STT and TBUT values in extra ocular diseases

Case number	Breed	Age	Sex	disease	STT OD	STT OS	TBUT OD	TBUT OS
1	spitz	5 years	Male	Corneal ulcer (OD & OS)	20	17	12	10
2	mastiff	2 1/2 years	Female	Keratoconjunctivitis sicca (OS)	15	6	8	6
3	ND	6 years	Male	Corneal opacity (OS)	18	18	18	16
4	Labrador	9 months	Male	Episcleritis (OS)	15	10	20	20
5	ND	3 1/2 years	Male	Corneal ulcer (OD)	18	18	20	20
6	ND	5 years	Female	Conjunctivitis (OD & OS)	15	15	22	22
7	pug	2 years	Female	Corneal ulcer (OD)	12	15	14	16
8	German shepherd	7 years	Female	Corneal opacity (OS)8	20	20	25	25
9	boxer	2 years	Male	Keratoconjunctivitis sicca (OD)	8	20	10	20
10	spitz	7 years	Male	Corneal ulcer (OS)	15	17	20	14
11	ND	10 years	Male	Conjunctivitis (OD)	17	17	22	22
12	Labrador	3 years	Female	Corneal opacity (OS)	22	22	20	20
13	spitz	6 years	Female	Corneal opacity (OD)	17	17	18	16
14	ND	3 years	Male	Blepharitis (OD & OS)	12	12	24	24
15	ND	1 year	Male	Keratitis (OS)	15	15	16	14
16	Labrador	7 years	Female	Keratoconjunctivitis sicca (OD)	4	18	10	18
17	spitz	2 1/2 years	Female	Conjunctivitis (OD & OS)	10	10	18	16
18	pug	2 years	Male	Corneal ulcer (OS)	17	17	20	15
19	pug	8 months	Male	Corneal ulcer (OS)	13	15	20	16
20	Lhasa apso	5 years	Female	Corneal ulcer (OD)	15	13	12	18
21	German shepherd	4 1/2 years	Female	Corneal ulcer (OD & OS)	9	9	10	10
22	pug	3 years	Male	Corneal ulcer (OS)	15	15	18	18
23	spitz	2 1/2 years	Female	Conjunctivitis (OS)	20	20	23	23
24	ND	2 years	Male	Corneal opacity (OD)	10	12	18	18
25	ND	1 year	Female	dermoid cyst (OD)	15	15	20	20
26	ND	9 1/2 years	Female	Keratoconjunctivitis sicca (OD)	6	15	10	18
27	spitz	8 years	Female	Corneal opacity (OS`)	25	25	25	25
28	ND	5 years	Female	Keratoconjunctivitis sicca (OS)	15	7	20	12

The extraocular diseases seen in spitz (21.43%), Mastiff (3.57%), Nondescriptive (32.15%), Labrador retriever (10.71%), Pug (14.29%), German shepherd (7.14%), Boxer (3.57%), Lhasa apso (3.57%), Great dane (3.57%). Among the diseased eyes corneal ulcer constituted (32.14%), corneal opacity (21.43%), and keratoconjunctivitis sicca (17.86%), conjunctivitis (14.29%) Blepharitis,

episcleritis, keratitis and dermoid cyst each constituted (3.57%). Extra ocular diseases were relatively more in female dogs (53.57%) than in males (46.43%) The age group affected was between 8 months to 10 years. The body weight of animals was between 3-35 kg. The extra ocular diseases were seen more in OS (46.43%) than in OD (35.71%) and both eyes (17.86%).

Table-2 Normal STT and TBUT values

Case number	Breed	age	Sex	STT OD	STT OS	TBUT OD	TBUT OS
1	ND	11 years	Male	17	15	20	18
2	Labrador	3 years	Female	22	20	26	26
3	ND	5 years	Male	14	13	15	15
4	ND	2 years	Male	18	16	18	18
5	GSD	10 years	Female	22	22	18	18
6	spitz	3 years	Male	18	18	20	20
7	GSD	2 years	Female	25	22	25	22
8	boxer	4 years	Male	22	20	22	22
9	ND	4 years	Female	18	17	20	20
10	spitz	9 years	Male	18	20	22	20
11	Great dane	2 years	Male	22	22	18	20
12	spitz	3 years	Female	14	15	18	16
13	Labrador	7 years	Male	20	22	25	22
14	ND	10 years	Female	17	18	20	18
15	spitz	10 years	Male	18	20	20	20
16	spitz	9 years	Female	15	15	17	15
17	ND	6 years	Male	17	20	18	18
18	Labrador	5 years	Female	22	22	25	25
19	GSD	11 years	Male	20	20	22	22
20	ND	5 years	Male	18	18	20	20
21	ND	7 years	Female	15	17	18	18
22	ND	13 years	Male	18	18	20	18
23	Labrador	4 years	Male	22	20	20	20
24	spitz	13 years	Female	15	14	16	16
25	ND	3 year	Female	25	22	18	18
26	spitz	10 years	Female	22	20	25	22
27	ND	5 years	Female	17	15	25	25
28	spitz	9 years	Male	22	20	20	18

The STT values for all 28 dogs belonging to extra ocular diseases were 14.75 ± 4.76 mm/min, 15.36 ± 4.39 mm/min for OD and OS respectively. In normal animals the STT values were 19.04 ± 3.14 mm/min, 18.61 ± 2.75 mm/min for OD and OS respectively and these values correlated with the findings of Hamor *et al.* (2000) and Alkan *et al.* (2004).

The tear break up time for extra ocular diseases were 17.61 ± 4.97 s, 17.57 ± 4.61 s for OD and OS respectively. In normal dogs the TBUT values observed as 20.39 ± 3.02 s, 19.64 ± 2.86 s for OD and OS respectively. Similar findings have been cited by Cullen *et al.* (2005) and also by Lim *et al.* (2005).

Statistical analysis was carried out using student 't' test. There was no significant difference in the values obtained in STT and TBUT between diseased and normal cases. There was no correlation between STT and TBUT in either OD or OS. The correlation between OD and OS in diseased animals is 0.5. In normal animals the correlation between OD and OS is 0.8.

Impression smear revealed the presence of neutrophilic, desquamated, numerous epithelial cells in all the cases.

References

Alkan, F., Izci, C., Tepe li, C. and Koc, Y. 2004. *Vlaams diergeneeskundig tijdschrift*, **73**:269-273.

Cullen, C.L., Lim, C. and Sykes, J. 2005. *Veterinary ophthalmology* **8(3)**: 159-165.

Davidson, H.J. and Kuonen, V.J. 2004. *Veterinary ophthalmology* **7(2)**:71-77.

Hamor, R.E., Roberts, S.M., Severin, G.A. and Chavkin, M.J. 2000. *American Journal of Veterinary Research*, **61(11)**: 1422-1425.

Lim C.C. and Cullen, C.L. 2005. *Veterinary ophthalmology* **8(5)**: 305-310.