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Incidence of ocular affections in dogs with special reference to corneal ulceration

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Abstract
Total 9878 cases were registered at TVCC during the period of ten months. Out of these 7887 (79.84%) cases were of canine, in which 176 (2.23%) were found suffering with various eye affections. Corneal ulceration was ascertained in total 30 (0.38%) dogs post screening. Among the eye affections majority of dogs were diagnosed with cataract (17.61%), followed by corneal ulceration (17.04%). Majority of dogs diagnosed with corneal ulcer were Pugs (53.33%), followed by Indian spitz (16.67%), Mongrel (16.67%), Boxer (6.67%), German Shepherd (3.33%) and Bull Mastiff (3.33%). Majority of affected dogs were between 0 to 2 years of age (46.67%), followed by 3 to 5 years (23.33%), 6 to 10 years (20%) and above 10 years of age (10%). In the present study 56.67% male and rest 43.33% female were suffering with corneal ulcers. Out of all affected dogs majority of the corneal ulcers were located in axial (40.00%) followed by perlimbal (23.33%), paraxial (16.67%) inferior nasal (13.33%) and inferior temporal (6.67%) positions.

Keywords: corneal ulcer, Shirmer tear test, fluoroscein dye test, location of ulcer

1. Introduction
Corneal ulcer is an inflammatory condition of the cornea involving loss of its outer layer. It is very common in dogs and is sometimes seen in cats. Causes include self-inflicted, trauma, eyelid abnormalities, thermal and chemical burns, immune mediated, facial paralysis, keratitis, absence of the protective tear film and infection with bacteria, viruses and fungal elements. Cornea consists of superficial epithelium, basement membrane, relatively acellular stroma, deeper descemet membrane and single layer of endothelium. It maintains a strong and durable barrier between the eye and environment, as well as a transparent medium to permit passage of light and images into the posterior segments (Gelatt, 2018) [1].

2. Materials and Methods
The present research work was carried out in the Department of Veterinary Surgery and Radiology, Teaching Veterinary Clinical Complex (TVCC), College of Veterinary Science and Animal Husbandry, Nanaji Deshmukh Veterinary Science University (N.D.V.S.U), Jabalpur, Madhya Pradesh (M.P.).

2.2 Meteorological data and features of place
Jabalpur is situated at 23.17˚ latitude and 79.57˚ East longitudes at 410.87 mean sea level in the southern part of second agro-climatic zone, including Satpura Plateau and Kymore hills. It has a tropical climate having average rainfall of 1241 mm.

2.3 Study period
The study was conducted for a period of ten months from June, 2018 to March, 2019.

2.4 Screening
Neurophthalmic examination and direct ophthalmoscopic examination was done on all the canine cases irrespective of age, sex and breed brought to TVCC during study period showing the problems related to vision.

3. Results and Discussion
3.1 Incidence
Total 9878 cases were registered at TVCC during the period of ten months (June, 2018 to March, 2019).

Out of these 7887 (79.84%) cases were of canine, in which 176 (2.23%) were found suffering with various eye affections. Corneal ulceration was ascertained in total 30 (0.38%) dogs post screening (Table 01).

Pandey (2016) [2] reported the incidence of various eye affections in dogs as 1.39% and incidence of corneal ulcer in dogs was calculated to be 0.18%. Akinrinmade and Ogungbenro (2015) [3] have reported much higher incidence of various eye affections in dogs i.e. 6.62%. Increasing incidence of eye affection in the recent year may be due to increase in canine population and it may also be due to day by day increase in environmental pollution.

Table 1: Incidence of eye affections and corneal ulcer in dogs

S. No.	Detail of cases	Number of cases	Per cent
1.	Cases registered at Teaching Veterinary Clinical Complex (TVCC)	9878	-
2.	Total number of canine cases	7887	79.84
3.	Cases of various eye affections in canine	176	02.23
4.	Cases of corneal ulcer in canine	30	0.38

3.2 Distribution of various eye affections

The data recorded are presented in Table 02. Among the eye affections majority of dogs were diagnosed with cataract (17.61%), followed by corneal ulceration (17.04%). The incidence of other ocular affections were lesser in number during the study period. (Plate 01)

In consonance with these findings Sellamani (2008) [4] reported year wise incidence of cataract to an of average 18.20% and Ramani *et al.* (2012) [5] reported 14.4% incidence of corneal ulcer. However, incidence of corneal ulcer was reported as 8.04% and 13.11% by Ancheril (2004) [6] and Pandey (2016) [2] respectively.

Table 2: Distribution of various eye affections

S. No.	Name of ocular affections	Number of cases	Per cent
1.	Cataract	31	17.61
2.	Corneal ulcer	30	17.04
3.	Conjuctivitis	21	11.93
4.	Epiphora	18	10.23
5.	Corneal opacity	13	7.39
6.	Traumatic injury	12	6.86
7.	Pigmentary Keratitis	10	5.68
8.	Spectacle eye	8	4.55
9.	Glaucoma	7	3.98
10.	Micropthalmos	4	2.27
11.	Blindness	4	2.27
12.	Exopthalmos	2	1.14
13.	Hyphema	2	1.14
14.	Growth on conjunctiva	2	1.14
15.	Infraorbital swelling	2	1.14
16.	Keratoconjuctivitis sicca	1	0.57
17.	Eyelid laceration	1	0.57
18.	Lens luxation	1	0.57
19.	Persistent pupillary membrane	1	0.57
20.	Retinal detachment	1	0.57
21.	Ectropion	1	0.57
22.	Tumour on eyelid	1	0.57
23.	Aqueous flakes	1	0.57
	Total	176	100

3.3 Breed wise distribution of corneal ulcer

The data recorded are presented in Table 03. Majority of dogs diagnosed with corneal ulcer were Pugs (53.33%), followed by Indian Spitz (16.67%), Mongrel (16.67%), Boxer (6.67%), German Shepherd (3.33%) and Bull Mastiff (3.33%).

Ramani *et al.* (2012) [5] also reported the highest incidence in Pug 37.26%, followed by Spitz 26.7%, non-descript 16.7%, Boxer and Labrador both had the incidence rate of 4.94%. Similarly, O'Neill *et al.* (2017) [7] studied corneal ulcerative disease in 21 breeds and reported highest incidence in Pug 5.42%, followed by Boxer breed 4.98%. In contrary to this Moore (2003) [8] reported that corneal ulceration was observed commonly in Boxer with 24.56% incidence, mixed breed 11.03%, but a high number of cases were also occurred in Poodle, Golden Retriever, Corgie, Labradors Springer Spaniel and German Shepherd. Weiner (2002) [9] found higher incidence of corneal ulcer in Spitz 51.85% followed by non-descript 22.22%, Lhasa Apso 7.41%, Great Dane, German Shepherd, Pug, Bull Terrier and Terrier 3.7%.

Higher incidence of corneal ulceration in Pug in the present study may be due to the fact that pronounced globe position of brachycephalic dogs like large palpebral aperture and a shallow socket promote greater exposure of less sensitive cornea and predispose eye to ocular trauma. Apart from this the hairs projecting from facial folds was other attributing reason.

Table 3: Breed wise distribution of corneal ulcer

S. No.	Name of the breed	Number of dogs	Per cent
1.	Pug	16	53.33%
2.	Indian Spitz	5	16.67%
3.	Mongrel	5	16.67%
4.	Boxer	2	6.67%
5.	German Shepherd	1	3.33%
6.	Bull Mastiff	1	3.33%
	Total	30	100

3.4 Age wise distribution of corneal ulcer

The data collected are presented in Table 04. Majority of affected dogs were between 0 to 2 years of age (46.67%), followed by 3 to 5 years (23.33%), 6 to 10 years (20%) and above 10 years of age (10%). Incidence was high in young dogs and mostly traumatic injuries were observed in this age group.

In accordance with these findings Ramani *et al.* (2012) [5] reported highest incidence of corneal ulcers (63.35%) in the age group of 3 months to 3 years. Similarly, Kim (2009) [10] and Rather (2016) [11] reported higher incidence of ulcer in 0-3 years of age and in age of 2 months to 1 year (66.66%) respectively. Contrary to this Moore (2003) [8] found incidence of corneal ulcer higher in middle aged dogs with a mean age of 8.2 years. Higher incidence of corneal ulcer in young age of 0-2years in the present study can be ascribed to the hyperactive and playful behavior of dogs sometimes leading to self-trauma or mutilation.

Table 4: Age wise distribution of corneal ulcer

S. No.	Age (Years)	Number of dogs	Per cent
1.	00 – 02	14	46.67
2.	03 – 05	07	23.33
3.	06 – 10	06	20.00
4.	Above 10	03	10.00
	Total	30	100

3.5 Sex wise distribution of corneal ulcer

The sex ratio of the animals has been presented in Table 05. In the present study 56.67% male and rest 43.33% female were suffering with corneal ulcers. This finding was similar to the finding of Rajasekaran (2007) [12], Deuri *et al.* (2012) [13], Ramani *et al.* (2013) [5] and Sale *et al.* (2013) who reported higher incidence in male dogs.

These finding can be attributed to the fact that male sex is always preferred as pet by majority of pet owner's therefore, may be the population of male dogs registered at TVCC was more. This may also be due to aggressive behaviour of male dogs which increased risk of trauma.

Table 5: Sex wise distribution of eye affections

S. No.	Sex	Number of dogs	Per cent
1.	Male	17	56.67
2.	Female	13	43.33
	Total	30	100

3.6 Fluorescein dye test

Fluorescein dye was used as ancillary diagnostic aid to examine different locations of corneal ulcer along with their size and depth. Damaged corneal epithelium exposed underlying layer of collagen or hydrophilic stroma which retained fluoroscein stain. It gave fluorescent green stain or apple green stain around the border of the ulcerated cornea for better visualization (Plate 02). In grade III ulcers with descemetocele, the Descemet′s membrane did not show fluorescein staining because it is hydrophobic but it was surrounded by fluorescein positive stromal defect. 4 cases of descemetocele and 2 cases of perforated descemetocele causing iris prolapse were recorded during the study period where only the wall of ulcer stained, not the floor. This finding was in accordance with Mitchell (2006) [14] and Maggs (2008) [15].

Lin and Lee (2002), Ollivier (2003) [17], Moore (2003) [8] and Amol (2016) [18] stressed the use of fluorescein dye for diagnosis and assessment of corneal epithelial defect or ulcerative keratitis.

3.7 Location of corneal ulcer

The data compiled during the study period are presented in Table 06. Out of all affected dogs majority of the corneal ulcers were located in axial (40.00%) followed by perlimbal (23.33%), paraxial (16.67%) inferior nasal (13.33%) and inferior temporal (6.67%) positions (Plate 02).

Table 6: Location of corneal ulcer

S. No.	Location of ulcer	Number of dogs	Per cent
1.	Axial	12	40.00
2.	Perilimbal	07	23.33
3.	Paraxial	05	16.67
4.	Inferior nasal	04	13.33
5.	Inferior temporal	02	06.67
	Total	30	100

These findings were comparable with the findings of Paula *et al.* (2011) [19] and Rather (2016) [11] who observed corneal ulcer at axial position in 40.14% and 57.14% dogs respectively. Similarly, Hvenegaard (2011) [20] and Dorbandt *et al.* (2015) [21] observed most ulcers were located at the centre of the cornea. However, Pandey (2016) [2] observed more number of cases at inferior temporal (33.33%) location followed by axial (16.67%), peripheral (16.67%) and inferior nasal (16.67%) positions.

The reason of majority of ulcers encountered in axial position may be due to subnormal corneal sensitivity, less frequent blinking, central thinning of precorneal tear film, relative lagopthalmos and bulbopthalmos specially observed in Pug.

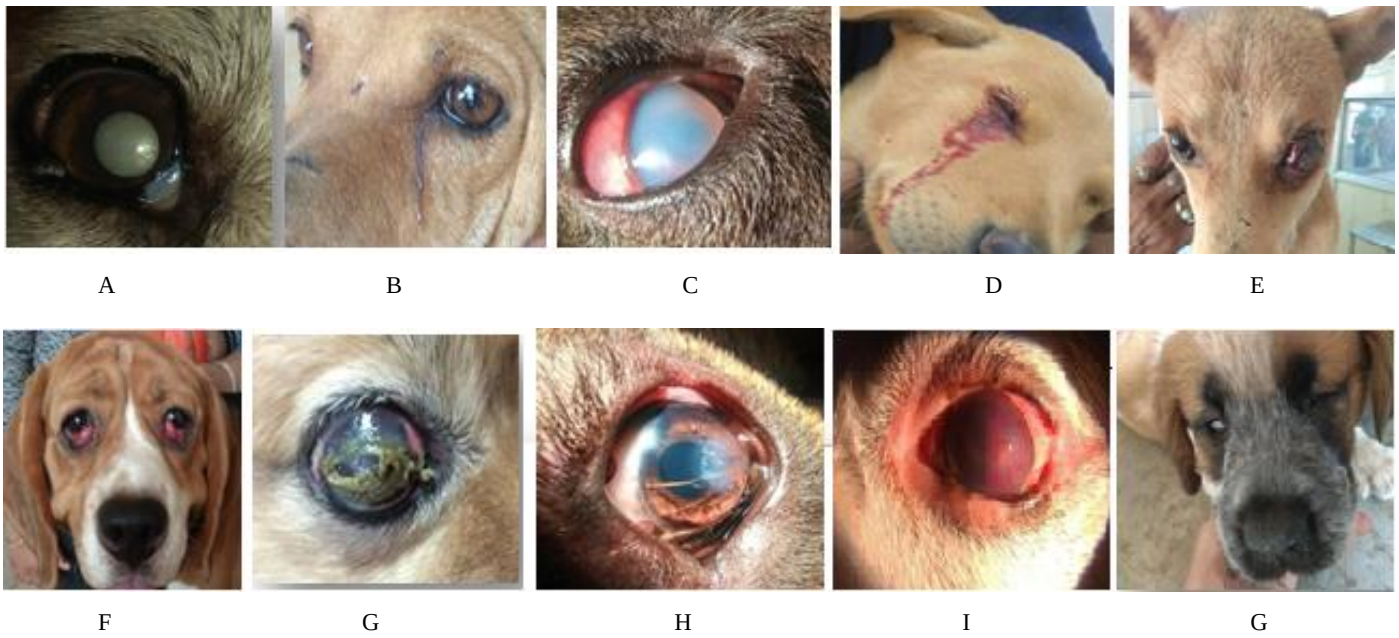

Plate 1: Eye affections (a) Cataract (b) Epiphora (c) Corneal opacity (d) Traumatic injury (e) Exopthalmos (f) Cherry eye (g) Keratoconjuctivitis sicca (h) Persistent pupillary membrane (i) Glaucoma (i) Micropthalmos

A B C D E

Plate 2: Location of corneal ulcer (a) Axial (b) Perilimbal (c) Inferior temporal (d) Paraxial (e) Inferior nasal

4. Conclusion

Cataract has highest incidence among all ocular affections in dogs followed by corneal ulcer, conjunctivitis, epiphora, corneal opacity, traumatic injury, pigmentary keratitis, spectacle eye and glaucoma etc. Among various breeds of dogs corneal ulceration was presented most in brachecephalic breeds *viz*. pug. Higher presentation of ulceration was seen in male dogs of 0-2 years age group due to playful nature and traumatic injuries.

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