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Studies on incidence of corneal ulcer in dogs

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Abstract
During the study period of June-2021 to July-2022, a total 7329 dogs were presented at the Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Anand with multiple diseases. Among them, 3.17 percent (232) dogs were presented for the diagnosis and treatment of various ocular affections. Out of 232 cases of various ocular affections, corneal melanosis was found to be higher followed by cataract and corneal ulcers were observed.

Keywords: Corneal ulcer, dogs, causative factor

Introduction
Affection of the eye is a common occurrence in all animal species. Corneal ulcer is one of the most common eye diseases in dogs and the most common reason for an eye to be painful along with being the most common cause of blindness in dogs, but in most of the cases, it is treatable. Hence the objective of the present study was to record incidence of corneal ulcer based on the Age, Sex, Breed, Symmetry, Affected eyes, Causative factor and Location of ulcer.

Materials and Methods
The study was conducted to find out the occurrence of corneal ulcer with respect to Age, Sex, Breed, Symmetry, affected eyes, Causative factor, Location of ulcer and type of ulcer in dogs presented at Veterinary Clinical Complex, KU, Anand from June, 2021 to July, 2022. General clinical examination and detailed ophthalmic examination including neuro–ophthalmic examination, special diagnostic procedures like, Schirmer tear test, Fluorescein test and Slit lamp biomicroscopy. The incidence of corneal ulcer was recorded and analysed.

Results and Discussion
During the study period of June-2021 to July-2022, a total 7329 dogs were presented at the Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Anand with multiple diseases. Among them, 3.17 percent (n=232) dogs were presented for the diagnosis and treatment of various ocular affections. Out of 232 cases of various ocular affections, corneal melanosis 34.05% (79 cases) was found to be higher followed by cataract 13.36% (31 cases) and corneal ulcer 10.34% (24 cases) were observed. The incidence (%) of corneal ulcer in dogs based on age is presented in Table 1. The percent incidence of corneal affections was found to be higher in age group of 1 to 4 years 45.83% (n=11) followed by <1year old dogs 37.50% (n=9), 5 to 8 year 12.50% (n=3), and > 12 years 4.17% (n=1), 9 to 12 years 00.00% (n=0). The present findings are in accordance with the observation reported by Turner and Blog (1997) [14], Kim *et al.* (2009) [7], Goulle (2012) [4], Ramani *et al.* (2013) [11], Parulekar (2016) [9], who also reported the highest incidence of corneal ulcer in 1 to 6 year age group and Patel *et al.* (2020) [10] observed higher incidence in 0 to 3 years age group followed by other age groups while Holmberg (1981) [5] reported the highest incidence in age group of <1 year. Sale *et al.* (2013) reported that increased ocular affection with age. The sex wise distributions of corneal ulcer in dogs presented in Table 2. The corneal ulcers were found to be equal in both male and female (50.00%, n=12, each). This finding is in accordance with the findings of Wilkie and Whittakar, (1997) [16]. However, Holmberg (1981) [5], Turner and Blog (1997) [14], Kim *et al.* (2009) [7], Venugopal (2011) [15], Goulle (2012) [4], Ramani *et al*, (2013) [11], Parulekar (2016) [9] and Patel *et al.* (2020) [10] reported that males were having higher incidence over females in cases of corneal ulcers in dogs. The percent incidence of corneal ulcers in different breeds of dogs presented in Table 3.

Pug 60.87% (n=14) breed was found to be highly affected with corneal ulcers than the Shih Tzu 12.50% (n=3), Pomeranian 4.17%, (n=1), French Bulldog 4.17% (n=1), Saint Bernard 4.17% (n=1), American bully 4.17% (n=1), Great Dane 4.17% (n=1), Belgian Shepherd 4.17% (n=1), and Labrador 4.17% (n=1). The over-representation of pug dogs with corneal ulcers may be because of lack many of the protective mechanisms operant in mesocephlic and dolichocephalic breeds (Barrett *et al.*, 1991) [1]. The brachiochephalic nature causes excessive protrusion of the eyeballs and predisposes them to trauma. Brachycephalic breeds have characteristics features like lagophthalmos which predispose them to corneal injuries (Kim *et al.*, 2009; Patel *et al.*, 2020) [7, 10]. Brachycepahlic dogs often have a thin lipid layer in the tear film and decreased aqueous coverage in the central cornea as a result of less blinking reflexes (Moore, 2003). Apart from this, the hairs projecting from facial fold and relatively low corneal sensitivity compared to mesocephalic and dolichocephalic dogs are also other attributing reasons. The inherent lower corneal sensitivity and protrusion of the globe in brachycephalic dogs negatively affect the protective mechanism of cornea, leads to an increased opportunity for traumatic injury and allow ulcers in the early stages to go unnoticed by owner (Kecova *et al.* 2004) [6]. Over-representation of pug dogs in this study could be attributed to their increased popularity as a pet. This gives idea about the most prone breed to get corneal ulcer in the dogs. The present findings corroborate well with the reports of Venugopal (2011) [15], Ramani *et al.* (2013) [11] and Parulekar (2016) [9] also reported the highest incidence of corneal ulcer in Pug. However, Holmberg, (1981) [5] and Kim *et al.*, (2009) [7] reported the highest incidence in Shih Tzu while Turner and Blog, (1997) [14] reported highest incidence in Boxer breed. The corneal ulcers were diagnosing and treated in 29 eyes from 24 dogs. Among them, five dogs (20.83%) had bilateral corneal ulcer and 19 dogs (79.17%) had unilateral corneal ulcer. The present findings corroborate well with the reports of Ramani *et al.* (2013) [11] and Patel *et al.* (2020) [10]. The presented cases of corneal ulcers were also classified according to affected eye which revealed that the right eye was found to be more affected than the left eye in dogs. During the period of present clinical study corneal ulcer was found more in right eye (62.07%, n= 18) than left eye (37.93%, n=11). The present findings are contradictory to the findings of Dorbandt *et al.* (2015) [17]. The location of the ulcers on the cornea of dogs is presented in Table 4. Location wise the ulcers were highly occurred on central region of cornea 44.82% (n=13), followed by 17.24% (n=5) ventro-temporal, 13.79% (n=4) dorso-nasal, 13.79% (n=4) dorso-temporal and 10.34% (n=3) ventro-nasal aspects. Similar results were also reported by Dorbandt *et al.* (2015) [17] and Patel *et al.* (2020) [10]. The higher percentage of centrally located ulcers might be due to exophthalmia, which prevents normal palpebral apposition and ultimately leads to uneven distribution of the tear film at central region of cornea. The dogs (n=24) covered in this study were also subjected to detailed history and clinical examinations of corneal ulcer. Based on the history and clinical observation, the affected dogs were categorized according to their causative factors which are presented in Table 5. The traumatic injuries 65.52% (n=19) to the cornea were found to be the highly prominent factor for the corneal ulcer followed by keratoconjunctivitis sicca 24.15% (n=7), entropion 6.89% (n=2) and chemical injury 3.44% (n=1). The results obtained in this study are in accordance with earlier studies by Mandell (2000) [8]. However, Kim *et al.* (2009) [7] reported that keratoconjunctivitis sicca (KCS) was the most common cause of ulcerative keratitis (31%) followed by logophthalmos (28%), bacterial infection (11%), nasal fold trichiasis (11%) and trauma (8%). The inherent lower sensitivity of cornea in brachycephalic dog breeds negatively affect the function of cornea protective mechanisms, which leads to traumatic injury to the cornea and allows the ulcers in the initial stages to go unnoticed by owners (Kecova *et al.*, 2004) [6].

Table 1: Age wise distribution of corneal ulcer in dogs

Age groups	No. of dogs	Percent
< 1 year	9	37.50
1 year to 4 years	11	45.83
5 year to 8 years	3	12.50
9 year to 12 years	-	-
>12 years	1	4.17
Total	24	100.00

Table 2: Sex wise distribution of corneal ulcer in dogs

Sex	No. of dogs	Percent
Male	12	50.00
Female	12	50.00
Total	24	100.00

Table 3: Breed wise distribution of corneal ulcer in dogs

Breeds	Number	Percent
Pug	14	60.87
Shih Tzu	3	12.50
Pomeranian	1	4.17
Saint Bernard	1	4.17
American bully	1	4.17
Great Dane	1	4.17
French Bulldog	1	4.17
Belgian shepherd	1	4.17
Labrador Retriever	1	4.17
Total	24	100.00

Table 4: Location wise distribution of corneal ulcer in dogs

Location of Corneal ulcer	No. of eyes	Percent
Central	13	44.82
Ventrotemporal	5	17.24
Dorsonasal	4	13.79
Dorsotemporal	4	13.79
Ventronasal	3	10.34
Total	29	100.00

Table 5: Causative factors in the cases of corneal ulcers

Causative factor	No. of eyes	Percent
Traumatic injury	19	65.52
Keratoconjunctivitis sicca	7	24.15
Entropion	2	6.89
Chemical injury	1	3.44
Total	29	100.00

Conclusions

Based on the result of the present study, it can be concluded that Corneal ulcers are the common ophthalmic condition of young Pug dogs. Traumas followed by Keratoconjunctivitis sicca were the common causes for the development of corneal ulceration in dogs.

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