



Prevalence and Impact of Eye Diseases in Indigenous Tripuri Cattle: An in-Depth Study from Tripura, India

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ABSTRACT

Background: In the lush expanses of Tripura, where the climate shifts from subtropical plains to temperate hills, cattle dominate the livestock population. However, these animals encounter significant challenges due to substandard management practices and the region's harsh weather. To uncover the prevalence and impact of eye diseases among Tripuri cattle, a comprehensive study spanned various districts of the state.

Methods: The study meticulously investigated clinically detectable eye diseases among indigenous Tripuri cattle across various locations in eight districts of Tripura state, including villages, institute livestock farms and local markets. Clinical assessments were conducted to identify various eye diseases, taking into account factors such as lesion type, breed, sex, age group, season and affected eyes. To ensure thorough examination, animals that did not cooperate were restrained using the auriculopalpebral nerve block method, as described. Detection of corneal ulcers was facilitated by the application of fluorescein dye (1%), following the method outlined by Angelo (1971).

Result: In total 1379 animals were surveyed. A notable 12.84% were afflicted by various ocular ailments. Corneal opacity emerged as the most common ailment, affecting 6.96% of the population, followed by infectious bovine keratoconjunctivitis (IBK) at 1.81% and corneal ulcers at 1.60%. Eye diseases were higher prevalence among male cattle (19.92%) compared to females (8.91%), with young animals showing a significantly elevated risk (19.96%) relative to adults (7.72%). Seasonal patterns indicated peak incidences during pre-monsoon months (4.13%), followed by monsoon (3.34%) and post-monsoon (3.19%), with winter offering slight relief (2.18%).

Key words: Breed, Eye diseases, Season, Sex, Tripuri cattle.

INTRODUCTION

With its diverse geographical and climatic characteristics, Tripura harbors a unique agricultural landscape, crucial to its economic sustenance. Spanning latitudes 22°6' to 24°32'N and longitudes 90°9' to 92°20'E, the state experiences a typical monsoon climate transitioning from subtropical plains to temperate hills, delineated by four distinct seasonal variations: pre-monsoon, monsoon, post-monsoon and summer (Chakrabarti, 1996a). Agriculture, constituting a significant portion of the state's economy, provides livelihoods for over half of its workforce, despite only 27% of its land being cultivable and 60% comprising highlands (Chakrabarti *et al.*, 2023). In this context, integrated farming systems (IFS) have emerged as a viable alternative for marginal farmers, with dairying serving as a preferred avenue for livelihood improvement (Chakrabarti *et al.*, 2022a).

Amidst this agrarian backdrop, cattle play a pivotal role, constituting 56.08% of Tripura's livestock population. Among these, the indigenous Tripuri cattle, with their nondescript characteristics, form a significant proportion, numbering 6.16 lakhs out of the state's total cattle population of 7.39 lakhs. Notably, Tripura contributes 0.43% of the nondescript and 0.38% of the total cattle population in the country, reflecting the region's significance in the national context. However, despite their integral role in milk, manure and draught operations,

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Tripuri cattle face a myriad of challenges, exacerbated by prevailing management practices characterized by semi-intensive or intensive systems (Chakrabarti *et al.*, 2022b).

Indeed, the management of Tripuri cattle often eschews routine feeding protocols in favor of locally available feed resources and traditional housing systems. This disregard for scientific management practices, as highlighted by Chakrabarti *et al.* (2014), can lead to a host of health

concerns, particularly eye diseases. Such ailments not only hamper livestock productivity but also reduce the economic life of the animals, posing significant challenges to agricultural sustainability in the region. Eye diseases among cattle are a major concern in the northeastern part of India, as underscored by Chakrabarti (1996b), Sharma *et al.* (1990) in Assam and Chakrabarti *et al.* (2014) in Bihar.

In light of these realities, the present study aims to elucidate the incidences of eye diseases among Tripuri cattle in Tripura. Through rigorous investigation and analysis, we seek to uncover the prevalence, patterns and potential causes of these ailments, with the overarching goal of informing targeted interventions to safeguard both animal welfare and agricultural sustainability in the region. By identifying key risk factors and proposing evidence-based solutions, we endeavor to mitigate the impact of eye diseases on livestock productivity and economic longevity, ultimately contributing to the well-being of farming communities and the broader agrarian landscape of Tripura.

MATERIALS AND METHODS

The study employed a systematic approach to investigate eye diseases in indigenous Tripuri cattle across eight districts in Tripura. A total of 1,379 cattle were randomly examined over a period of 36 months, from April 2021 to March 2024. The sampling technique utilized was a random sampling method, ensuring that each animal in the population had an equal chance of selection. This approach aimed to provide a representative sample of the cattle population, facilitating reliable insights into the prevalence and distribution of eye diseases.

To ensure comprehensive data collection, clinical assessments were conducted based on various factors, including lesion type, breed, sex, age group, season and the specific eyes affected. For animals that did not cooperate during examinations, the auriculopalpebral nerve block method was applied, as described by Soma (1971), to ensure accurate assessment without causing undue stress or harm.

Statistical analysis was performed using Chi-square analysis, as prescribed by Snedecor and Cochran (1989), to evaluate the homogeneity of the collected data across different groups. This method allowed for the comparison of categorical variables, helping to identify significant differences in the prevalence of eye diseases based on factors such as sex, age and season. By employing these statistical methods alongside a robust sampling technique, the study aimed to provide a comprehensive understanding of the characteristics and prevalence of eye diseases among Tripuri cattle, thereby informing future interventions and management strategies.

RESULTS AND DISCUSSION

In total 1379 Tripuri cattle were surveyed for eye diseases in the state under indigenous cattle project. It was found during three year study in different season in the state that

177 cattle were affected by various eye ailments (Table 1), among which Corneal opacity was recorded maximum as 54.24% in Tripuri cattle (Fig 1) followed by Infectious Bovine Keratoconjunctivitis (14.12%). Among the various eye diseases 96 (6.96%) animals were suffering from corneal opacity, 25 (1.81%) infectious bovine keratoconjunctivitis (IBK), 22 (1.60%) corneal ulcer, 12 (0.87%) glaucoma, 8 (0.58%) cataract, 5 (0.36%) staphyloma, 4 (0.29%) microcornea, 3 (0.22%) external injury and 2 (0.15%) corneal dermoid. Sharma *et al.* (1990) in Assam, Chakrabarti (1996) in Tripura (12.45%) and Chakrabarti *et al.* (2014) in Bihar (15.22%) reported similar trends in cattle eye ailments. The current study found a comparable incidence (12.84%) of various eye diseases in indigenous Tripuri cattle in Tripura state. Chakrabarti (1996) in Tripura and Chakrabarti *et al.* (2014) in Bihar opined that the higher incidences of various eye ailments in cattle might be due to following of unscientific and poor management systems and also lack of timely eye care with veterinary aid for the animals.

Among all the eye ailments corneal opacity were found highest in number (6.96%). Charkrabarti (1996) in Tripura (7.13%) and Chakrabarti *et al.* (2014) in Bihar (8.93%) also found higher number of corneal opacity among all the eye ailments in cattle. They opined that corneal ulcers, even after healing, tend to leave an opaque area for an extended period and untreated cases of IBK often result in corneal opacity or other complications.

The present study observed that the incidences of eye diseases in Tripuri cattle were 12.84% (Table 2). Whereas, Chakrabarti (1996) and Chakrabarti *et al.* (2014) in Bihar reported the incidences were 12.45% in cattle in Tripura and 12.61% in non-descript zebu cattle and 18.94% in crossbred (Holstein Friesian and Jersey) cattle in Bihar, respectively. Moreover, significant differences ($P < 0.01$) were found among the breeds, indicating that indigenous cattle had lower incidences of eye diseases compared to crossbred animals. The higher susceptibility in crossbred animals may be attributed to their lower immunity compared

Table 1: Incidence of different types of eye diseases in Tripuri cattle.

Different type of observed disorders	Total number of animals affected (177)	Percentage of affected out of total animals (1379)
	Number	Percentage
Corneal opacity	96	6.96
Infectious bovine Keratoconjunctivitis (IBK)	25	1.81
Corneal ulcer	22	1.60
Glaucoma	12	0.87
Cataract	8	0.58
Staphyloma	5	0.36
Microcornea	4	0.29
External injury	3	0.22
Corneal dermoid	2	0.15
Total	177	12.84

to zebu cattle. Male animals were significantly more affected (19.92%) than females (8.91%) and young animals had a higher incidence (19.96%) of eye diseases compared to adults (7.72%). This lower incidence in adults is likely due to the acquired immunity through previous, unnoticed infections (Chakrabarti, 1996). Males suffer more possibly because they are more involved in field work, increasing their risk of trauma, accidents and eye injuries compared to females (Chakrabarti *et al.*, 2014).

Similar trends were reported in Bihar, where significant differences ($P < 0.01$) were observed in eye disease incidences based on sex and age group. In Bihar, male animals (20.96%) were more susceptible than females (12.08%) and younger animals (below three years) had higher infection rates (19%) than adults (13.33%). These findings are consistent with earlier studies by Wilcox (1968), Khot and Ajinka (1980), Sharma *et al.* (1990), Chakrabarti (1996) and Chakrabarti *et al.* (2014).

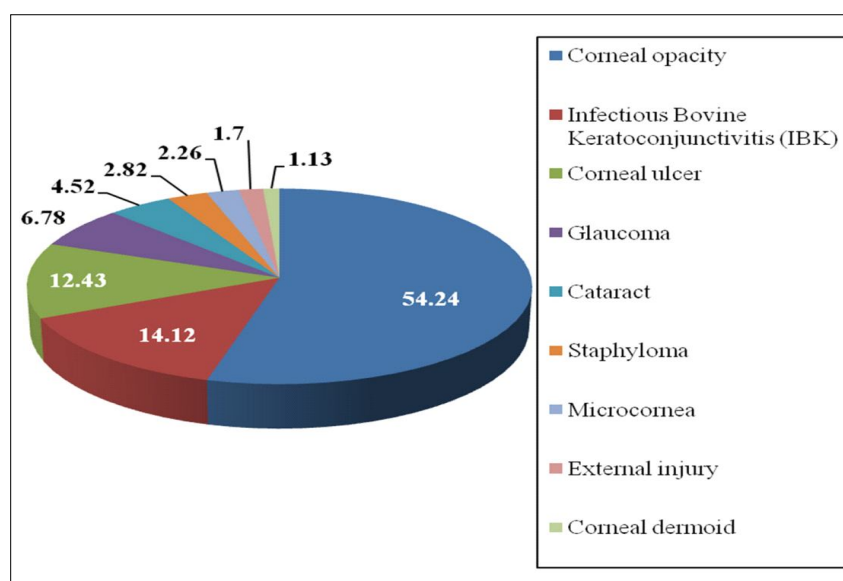


Fig 1: Per cent incidence of different types of eye diseases in Tripuri cattle.

Table 2: Eye diseases of Tripuri cattle in relation to breed, sex and age group.

	Animals	Number of animals observed	Number of animals affected	Percentage of animals affected	χ^2 value
Breed	Tripuri cattle (Non-descript)	1379	177	12.84	
Sex	Male	492	98	19.92	25.83 ($P > 0.05$)
	Female	887	79	8.91	
Age group	Young (Below 3 Years)	576	115	19.96	34.20 ($P > 0.05$)
	Adult (Above 3 years)	803	62	7.72	

Table 3: Eye diseases Tripuri cattle in relation to season.

Season	Number of observed animals	Animals affected		Percentage of affected out of total	χ^2 value animals (1379)
		Number	Percentage		
Pre-monsoon (March, April, May)	298	57	32.20	4.13	1.23 ($P > 0.05$)
Monsoon (June, July, August)	305	46	25.99	3.34	
Post-Monsoon (September, October, November)	350	44	24.86	3.19	5.59** ($P < 0.01$)
Winter (December, January, February)	426	30	16.95	2.18	
Total	1379	177	100.00	12.84	

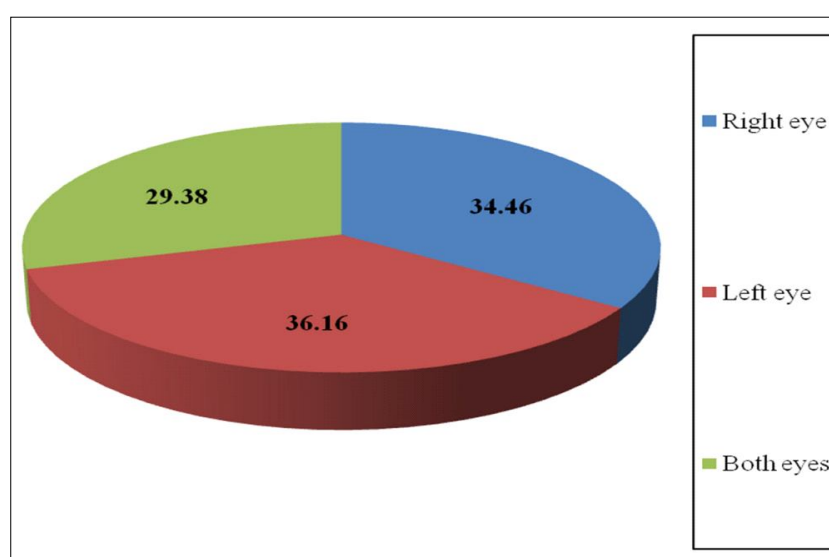


Fig 2: Per cent animals affected with eye diseases in Tripuri cattle.

Table 4: Eye diseases of cattle in relation to eyes affected.

Eyes affected	Animals affected	Percentage of affected out of total animals (1379)
	Number	percentage
Right eye	61	4.42
Left eye	64	4.65
Both eyes	52	3.77
Total	177	12.84

The study of eye diseases in different season varied significantly ($P < 0.01$). The highest incidences were observed in pre-monsoon period (4.13%), followed by monsoon (3.34%), post-monsoon (3.19%) and winter (2.18%), respectively (Table 3). Chakrabarti (1996) reported maximum eye diseases in cattle in Tripura during summer months (7.44%) and in winter months the incidences were 5.01%. In Bihar Chakrabarti *et al.* (2014) reported incidences were 4.66% in Pre-monsoon, 3.57% in monsoon, 3.53% in post-monsoon and 3.46% in winter months. They opined that the highest incidence of eye diseases in the pre-monsoon months could be due to harsh conditions such as intense sunlight, sand and storms, combined with inadequate feeding, housing and healthcare management during this period. The current findings align with previous studies by Wilcox (1968), Bryan *et al.* (1973), Sharma *et al.* (1990), Chakrabarti (1996) and Chakrabarti *et al.* (2014), which reported similar seasonal trends in cattle eye diseases.

In relation to the eyes affected it was observed that out of the total animals surveys, the left eyes (4.65%) were affected more than the right eye (4.42%). In 3.77% cases both eyes were involved (Table 4) as in the case depicted clearly in Fig 2. Chakrabarti (1996) reported more ailments in left eye (5.56%) than the right eye (5.25%) and only 1.64%

cases in botheyes. Chakrabarti *et al.* (2014) noted a similar trend of eye affections in cattle in Bihar. However, the present study found the left eye was more frequently affected than the right eye. This difference might be due to accidental factors or inadequate care and health management. Typically, when one eye is affected, farmers tend to provide better care, reducing the likelihood of both eyes becoming involved. These findings are consistent with previous studies by Slatter *et al.* (1982); Sharma *et al.* (1990); Chakrabarti (1996) and Chakrabarti *et al.* (2014).

CONCLUSION

The study of eye diseases among indigenous Tripuri cattle revealed that 12.84% of the 1,379 surveyed animals were affected, with corneal opacity being the most common condition (6.96%), followed by infectious bovine keratoconjunctivitis (1.81%) and corneal ulcers (1.60%). Male cattle exhibited a higher prevalence (19.92%) than females (8.91%) and young animals faced significantly increased risk (19.96%) compared to adults (7.72%). Seasonal analysis showed peak incidences during pre-monsoon months (4.13%). These findings underscore the need for targeted health management practices, particularly for young and male cattle, along with improved veterinary care and preventive strategies during high-risk seasons to mitigate the prevalence of eye diseases in this livestock population.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

All animal procedures for experiments were approved by the Committee of Experimental Animal care and handling techniques were approved by the University of Animal Care Committee.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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