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Prevalence of clinical and subclinical mastitis in dairy cows and buffaloes of Jabalpur district of Madhya Pradesh

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Abstract

Mastitis is a global problem denoting an inflammatory condition of the udder. It is estimated that higher percentage of dairy animals are suffering from clinical and subclinical mastitis and causing huge economic losses to the dairy industry. The present study was undertaken to determine the prevalence of clinical and subclinical mastitis in dairy cattle and buffaloes of different dairy farms of Jabalpur district of Madhya Pradesh. A total of 430 bovines including 102 dairy cattle and 328 buffaloes were screened for clinical and subclinical mastitis by California mastitis test. The prevalence of clinical and subclinical mastitis in cow was detected 17.64% and 36.27% respectively while in buffaloes the prevalence was recorded 5.18% and 14.63% respectively. In this study cow revealed a higher prevalence of clinical mastitis and subclinical mastitis than the buffaloes. Moreover, subclinical form of mastitis was higher than clinical mastitis.

Keywords: Clinical mastitis, subclinical mastitis, California mastitis test, Jabalpur, buffaloes, cattle

Introduction

In India, dairy industry is playing an important role in income generation and self-employment of an individual. The dairy sector of Madhya Pradesh is increasing day by day as the majority of population (75%) reside in the villages and most of them have income from agriculture (Audarya *et al.*, 2021) [1]. According to 20th livestock census, in Madhya Pradesh the total bovine population in 2019 increased by 1% to that of previous census and the population of cattle and buffaloes were 18.7 million and 10.3 million, respectively. Dairy sector of Madhya Pradesh is producing 3rd largest milk with total production of 15.91 million tonnes, which is 8.5% of total milk production of country during 2018-19 (NDDDB, 2019) [2]. Among several factors causing huge loss to the dairy industry, mastitis occupies major cause of concern (Singh *et al.*, 2021) [3].

Mastitis is an economically important infectious disease of cattle and buffalo and one of the major constraints in milk production. This disease is considered a worldwide production disease of dairy animals (Hogeveen *et al.*, 2011) [4]. Mastitis is responsible for nearly 70% of milk loss. The economic losses due to mastitis have been estimated to be Rs. 7165.51 crores per year in India (Bansal and Gupta, 2009) [5]. In those countries having well-developed dairy industry, morbidity of mastitis in dairy cow is 40%. Affected bovines may lose their total milk production. Milk from bovines with mastitis is unfit for human consumption because some mastitis causing bacteria are zoonotic and can cause human infections (Patil *et al.*, 2015) [6].

Mastitis is characterized by inflammatory changes in milk and udder tissue. It is a global problem as it adversely affects on animal health, quality of milk and economics of milk production and every country including developed one suffers huge financial losses related to culling, decreased production, decreased fecundity and treatment costs (Kumari *et al.*, 2018) [7]. There are two forms of mastitis, clinical and subclinical mastitis. Clinical mastitis. The clinical mastitis is characterized by local visible inflammatory changes in milk and udder tissue with or without systemic clinical signs whereas subclinical mastitis does not manifest clinical signs of mastitis but increased somatic cell counts with the presence of the causative agents. In India prevalence of clinical mastitis in bovines ranged from 4.77 to 18.74% (Sharma *et al.*, 2007; Ghose, 2000 and Bhat *et al.*, 2017) [8, 9, 10]. Subclinical mastitis is a major silent problem and one of the major reasons for low yield and poor-quality milk and ranks first among the diseases that cause substantial loss to owners.

In India about 70-80% economic loss has been attributed due to sub clinical mastitis. Subclinical mastitis can lead to 10-20% decrease in milk production. In this form of mastitis milk appears normal and visible abnormalities such as udder swelling, hardness of the affected quarter, pain, milk containing flakes, clots and watery milk remains absent.

For the prevention and control, early detection of mastitis specially subclinical mastitis is important as sometimes it becomes untreatable at later stages. It cannot be identified without a laboratory or field tests. Therefore, the present study was undertaken to determine the prevalence of clinical and subclinical mastitis in dairy cattle and buffaloes of different dairy farms of Jabalpur district of Madhya Pradesh.

Materials and Methods

Place and duration of work

The proposed work was conducted in the Department of Veterinary Microbiology, College of Veterinary Science and Animal Husbandry, Livestock Farm, Adhartal, Nanaji Deshmukh Veterinary Science University, Jabalpur, Madhya Pradesh, and different dairy farms in and around, Jabalpur district of Madhya Pradesh. The study was conducted for a period of 12 months from July 2020 to June 2021.

Physical examination of udder and milk

The udder was examined for any evidences of atrophy, consistency and changes in size by manual palpation. Teats were observed for any alterations such as injury, wounds and scars. Milk was examined for visible abnormalities including

discolouration, clots, flakes and pus, presence of blood or blood stains and consistency, if any at the time of milking. The udder was also examined to ascertain any sort of abnormality, unilateral or bilateral.

Sample collection

A total of 430 bovines (Cow = 102 and Buffalo = 328) were screened for clinical and sub-clinical mastitis from five dairy farms in and around Jabalpur district of Madhya Pradesh. Milk samples from all the four quarters were screened aseptically as described by Quinn *et al.* (2004) [11] by washing the teats, drying and cleaned with cotton soaked in 70% ethyl alcohol. First few streams of milk were discarded and subsequently equal amount of milk from all four quarters directly taken into California mastitis test (CMT) paddle and tested for mastitis.

California Mastitis Test (CMT)

The tests were carried out as per the methods mentioned by Ruegg and Reinemann (2002) [12] and Dhakal (2006) [13]. Briefly, the milk from the four quarters was collected in the CMT paddle after discarding the first few strippings of the milk. The paddle was tilted so that the excess milk was drained off and all the cups in the paddle contained equal amount of milk. The CMT reagent (3% Sodium Dodecyl Sulphate) was added to all the cups equal to the amount of milk already contained in the cups representing the four quarters. The paddle was gently swirled and the CMT score was read within 10 seconds (Table 1).

Table 1: Interpretation of CMT scores and approximate corresponding SCC values

CMT score	Visible reaction	SCC range (cells/ ml)	Interpretation
Negative	Mixture remains liquid – no evidence of precipitate	0-200,000	Normal milk
Trace	Slight precipitate, disappears with continued movement	150,000-500,000	Subclinical mastitis
1.	Distinct precipitate but no tendency towards gel formation	400,000-1,500,000	Subclinical mastitis
2.	Mixture thickens immediately moves towards centre	800,000-5,000,000	Subclinical mastitis
3.	Gel forms and surface become convex	>5,000,000	Clinical mastitis

Results and Discussion

Prevalence of clinical and subclinical mastitis in Cow

Out of 102 milk samples screened from Cow, clinical mastitis and subclinical mastitis were detected positive for 18 and 37

samples, respectively. The 17.64% (n = 18/102) clinical mastitis and 36.27% (n = 37/102) subclinical mastitis was detected in cow (Table 2).

Table 2: Prevalence of clinical and subclinical mastitis in bovine species by California Mastitis Test

S. No.	Particulars	Clinical mastitis	Percent positive	Sub-clinical mastitis	Percent positive
1	Cow (n=102)	18	17.64	37	36.27
2	Buffalo (n = 328)	17	05.18	48	14.63
	Total (n = 430)	35	08.14	85	19.76

Kader *et al.* (2002) [14] reported higher prevalence (46.60%) of subclinical mastitis in dairy cows whereas Meher *et al.* (2018) [15] reported lower prevalence (28.50%) compared to present study. Mir *et al.* (2014) [16] found a higher prevalence (57.80%) of subclinical mastitis when following the criteria of both CMT and culturally positive samples. However, these results were obtained from farms with machine milked cows. Bangar *et al.* (2015) [17] also reported higher prevalence (46.40%) whereas similar prevalence (39.80%) was observed by many workers (Sharma *et al.*, 2012; Swami *et al.*, 2017) [18, 19].

Prevalence of clinical and subclinical mastitis in buffaloes

Out of 328 milk samples screened from Buffaloes, 17 samples were positive for clinical mastitis whereas 48 samples were

detected positive for subclinical mastitis. The 5.18% (n = 17/328) clinical mastitis and 14.63% (n = 48/328) subclinical mastitis was detected in Buffaloes. The overall prevalence of clinical and subclinical mastitis irrespective of species was recorded 08.14% and 28.14%, respectively. The finding is similar with Yadav *et al.* (2019) [20] who observed 38.33% and 16.32% subclinical mastitis in cow and buffaloes, respectively. Krishnamoorthy *et al.* (2021) [21] reported higher prevalence of clinical mastitis 18% and subclinical mastitis 45% in India.

Comparison of clinical and subclinical mastitis prevalence in cow and buffalo

In the present study cow revealed a higher prevalence of clinical mastitis (17.64%) and subclinical mastitis (36.27%)

than the buffaloes (05.18% and 14.63%, respectively). The results were in agreement with Yadav *et al.* (2019)^[20], Swami *et al.* (2017)^[19] and Saini *et al.* (1994)^[22]. Less incidences of the disease in buffaloes might be due to the thick and compact epithelium, thick keratin layer and thick muscle sphincter in streak canal of udder of buffaloes as compared to crossbred cows and the similar results obtained earlier (Uppal *et al.*, 1994)^[23].

Comparison of clinical mastitis prevalence with subclinical mastitis prevalence

Prevalence of subclinical form of mastitis was higher than clinical mastitis. Similar finding was observed by Sharma *et al.* (2018)^[24] who found subclinical mastitis prevalence in buffaloes 26.40% in unorganized farms and 15.33% in organized farms than clinical mastitis 8.67% in organized farms and 9.60% in unorganized farms. The variation in prevalence and incidence of mastitis between the different studies might be partly due to different types of diagnostic tests, sampling procedures, management practices, geographical locations as criteria for mastitis as well as factors such as stage of lactation, parity number and breed of the animals included in the studies.

Conclusions

The study concluded that the prevalence of clinical and subclinical mastitis in cow was 17.64% and 36.27% respectively whereas the prevalence in buffaloes was 5.18% and 14.63% respectively. In this study cow revealed a higher prevalence of clinical mastitis and subclinical mastitis than the buffaloes. Moreover, subclinical form of mastitis was recorded higher than clinical mastitis.

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Conflict of interest

All authors declare no conflict of interest.

References

- Audarya SD, Chhabra D, Sharda R, Gangil R, Sikrodiya R, Jogi J, *et al.* Epidemiology of bovine mastitis and its diagnosis, prevention and control, 2021. DOI: <http://dx.doi.org/10.5772/intechopen.100582>.
- NDDDB. Annual report of National Dairy Development Board 2018-19, 2019. <http://www.nddb.coop>.
- Singh K, Mishra KK, Shrivastava N, Jha AK, Ranjan R, *et al.* Prevalence of sub-clinical mastitis in dairy cow of Rewa district of Madhya Pradesh. *Journal of Animal Research*. 2021;11(1):89-95.
- Hogeveen H, Huijps K, Lam TJGM. Economic aspects of mastitis: New developments. *New Zealand Veterinary Journal*. 2011;59:16-23.
- Bansal BK, Gupta DK. Economic analysis of bovine mastitis in India and Punjab-a review. *Indian Journal of Dairy Science*. 2009;62:337-345.
- Patil MP, Nagvekar AS, Ingole SD, Bharucha SV, Palve VT. Somatic cell count and alkaline phosphatase activity in milk for evaluation of mastitis in buffalo. *Veterinary World*. 2015;8:363-366.
- Kumari T, Bhakat C, Choudhary RK. A review on subclinical mastitis in dairy cattle. *International Journal of Pure & Applied Biosciences*. 2018;6(2):1291-1299.
- Sharma A, Sindhu N. Occurrence of clinical and subclinical mastitis in buffaloes in the state of Haryana (India). *Italian Journal of Animal Science*. 2007;6(2):965-967.
- Ghose B. Studies on certain aspects of bacterial mastitis in cows [thesis]. Jabalpur: Jawaharlal Nehru Krishi Vishwavidyalaya (JNKVV), 2000.
- Bhat AM, Soodan JS, Singh R, Dhobi IA, Hussain T, Dar MY, *et al.* Incidence of bovine clinical mastitis in Jammu region and antibiogram of isolated pathogens. *Veterinary World*. 2017;10:984-989.
- Quinn PJ, Carter ME, Markey B, Carter GR. *Clinical Veterinary Microbiology*. London, Wild life Publisher, 2004, 95-101.
- Ruegg PL, Reinemann DJ. Milk quality and mastitis tests. *The Bovine Practitioner*. 2002;36(1):41-54.
- Dhakal IP. Normal somatic cell count and subclinical mastitis in Murrah Buffaloes. *Journal of Veterinary Medicine*. 2006;53:81-86.
- Kader MA, Samad MA, Saha S, Taleb MA. Prevalence and etiology of sub clinical mastitis with antibiotic sensitivity to isolated organisms among milch cows in Bangladesh. *Indian Journal Dairy Science*. 2002;55:218-223.
- Meher MM, Hasan A, Afrin M. Field investigation on subclinical mastitis in cows in different areas of Barisal district in Bangladesh. *Turkish Journal of Agriculture, Food Science and Technology*. 2018;6(9):1159-1162.
- Mir AQ, Bansal, BK, Gupta DK. Subclinical mastitis in machine milked dairy farms in Punjab: prevalence, distribution of bacteria and current antibiogram. *Veterinary World*. 2014;7(5):291-294.
- Bangar YC, Singh B, Dohare AK, Verma MR. A systematic review and meta-analysis of prevalence of subclinical mastitis in dairy cows in India. *Tropical Animal Health Production*. 2015;47(2):291-297.
- Sharma A, Chhabra R, Sindhu N. Prevalence of sub-clinical mastitis in cows: Its etiology and antibiogram. *Indian Journal of Animal Research*. 2012;46(4):348-353.
- Swami SV, Patil RA, Gadekar SD. Studies on prevalence of subclinical mastitis in dairy animals. *Journal of Entomology and Zoology Studies*. 2017;5(4):1297-1300.
- Yadav R, Kumar P, Sandeep. Prevalence of bovine subclinical mastitis in Mahendragarh and Rewari districts of south Haryana. *Haryana Veterinary*. 2019;58(1):97-100.
- Krishnamoorthy P, Goudar AL, Kuralayanapalya PS, Roy P. Global and countrywide prevalence of subclinical and clinical mastitis in dairy cattle and buffaloes by systematic review and meta-analysis. *Research in Veterinary Science*. 2021;136:561-586.
- Saini SS, Sharma JK, Kwatia MS. Prevalence and etiology of sub-clinical mastitis among crossbred cows and buffaloes in Punjab. *Indian Journal Dairy Science*. 1994;47:103-106.
- Uppal SK, Singh KB, Roy KS, Nauriyal DC, Bansal BK. Natural defense mechanism against mastitis: a comparative Histo-morphology of buffalo and cow teat canal. *Buffalo Journal*. 1994;2:125-131.
- Sharma N, Huma Z, Singh SG, Navjot Sharma S, Gupta SK, *et al.* Prevalence of clinical and subclinical mastitis in buffaloes of Jammu region. *International Journal of Agriculture, Environment and Biotechnology*. 2018;11(2):415-420.