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Occurrence of clinical and subclinical mastitis in buffaloes and associated bacterial pathogens

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Abstract

Mastitis is one of the most prevalent and economically important diseases affecting dairy buffaloes in India, with subclinical mastitis posing a greater threat due to its silent nature and prolonged impact on milk production. The present study was conducted to determine the prevalence of mastitis in buffaloes under field conditions and to assess its distribution in relation to clinical and subclinical forms. Buffaloes from selected dairy farms were screened using clinical examination of the udder and milk, along with standard diagnostic tests including CMT for the detection of subclinical mastitis. The overall prevalence of mastitis was found to be high i.e. around 42.66%, with subclinical mastitis occurring more frequently accounting for 31% than the clinical form that only accounts for 11.66%. Poor milking hygiene, unfavourable environmental conditions, and lack of routine screening were identified as major predisposing factors. The high prevalence of subclinical mastitis highlights its significant role in reducing milk yield and quality, leading to substantial economic losses for dairy farmers. Early diagnosis and implementation of effective preventive strategies are essential to control mastitis and improve udder health in buffaloes. The findings emphasize the need for regular monitoring programs and farmer awareness to minimize the impact of mastitis on the dairy sector.

Keywords: Buffalo, CMT, dairy animals, mastitis, prevalence, subclinical mastitis, udder health

Introduction

Mastitis is one of the most prevalent and economically devastating diseases affecting dairy animals worldwide, posing a major constraint to profitable milk production [1]. In India, where the dairy sector contributes significantly to agricultural GDP and rural livelihoods, mastitis continues to be a persistent problem in both cattle and buffaloes [6]. The disease not only reduces milk yield and alters milk composition but also compromises animal health and welfare, leading to substantial economic losses due to treatment costs, discarded milk, reduced market value of animals, and increased labour requirements [3, 4].

Buffaloes contribute more than 45% of India's total milk production and represent a vital component of the dairy industry. Despite being traditionally considered more resistant to mastitis than cattle, buffaloes are increasingly affected due to intensive production systems, poor housing hygiene, hot and humid climatic conditions, and unscientific milking practices. The prevalence of mastitis in buffaloes varies widely across regions and management systems, with subclinical mastitis reported far more frequently than the clinical form. Subclinical mastitis remains a major concern because of its asymptomatic nature, making detection difficult while causing prolonged reductions in milk production and quality [5].

Mastitis is broadly classified into clinical and subclinical forms based on the presence or absence of visible signs in the udder and milk. Subclinical mastitis is particularly significant from an epidemiological standpoint, as it serves as a reservoir for infection and facilitates the transmission of pathogens within herds. Common etiological agents associated with mastitis include *Staphylococcus aureus*, *Escherichia coli*, and various *Streptococcus* species, with their prevalence influenced by environmental and management factors [2].

Understanding the prevalence of mastitis under field conditions is essential for designing effective control and prevention strategies. Accurate prevalence data provide insights into the

magnitude of the problem and help in identifying risk factors associated with disease occurrence. Therefore, the present study was undertaken to assess the prevalence of mastitis in buffaloes, with particular emphasis on subclinical mastitis, under local dairy farming conditions.

Materials and Methods

Study area

The present study was conducted in and around the Ayodhya and Amethi region of Uttar Pradesh, India. The area is characterized by a tropical climatic condition with hot summers and moderate to high humidity, which predisposes dairy animals to udder infections. Buffaloes maintained under smallholder and semi-intensive dairy farming systems were included in the study.

Study animals

A total number of 300 lactating buffaloes of different ages, parities, and stages of lactation were screened for mastitis during the study period. Animals were selected randomly from organized and unorganized dairy farms. Buffaloes with a history of recent antibiotic treatment were excluded from the study to avoid diagnostic interference.

Study design

A cross-sectional study was carried out to determine the prevalence of mastitis in buffaloes. The prevalence was assessed at both animal level and quarter level. Mastitis was categorized into clinical and subclinical forms based on clinical examination and milk testing.

Clinical examination

Each buffalo was examined clinically for signs of mastitis such as swelling, pain, heat, and hardness of the udder. Milk from each quarter was examined for visible abnormalities including watery consistency, flakes, clots, or discoloration. Animals showing visible udder and milk abnormalities were recorded as cases of clinical mastitis.

Screening for subclinical mastitis

Milk samples from all apparently healthy quarters were screened for subclinical mastitis using standard indirect diagnostic tests. The Modified California Mastitis Test (MCMT) was employed as a cow-side test to detect elevated somatic cell content indicative of subclinical infection. Quarters showing positive reactions were considered as subclinical mastitis cases.

Milk sample collection

Milk samples were collected aseptically from each quarter after thorough cleaning and disinfection of teats. The first few streams of milk were discarded, and samples were collected in sterile containers for further examination wherever required.

Calculation of prevalence

The prevalence of mastitis was calculated as the proportion of animals and quarters affected with clinical and subclinical mastitis. Animal-wise prevalence was calculated based on the number of buffaloes affected, while quarter-wise prevalence was calculated based on the total number of quarters examined.

Statistical analysis

Data obtained were compiled and analyzed using standard descriptive statistical methods. The prevalence of mastitis was expressed in percentage terms to evaluate the magnitude of the disease under field conditions.

Result and Discussion

A total of 300 lactating buffaloes were screened for mastitis in Ayodhya and Amethi districts. Of these, 128 buffaloes (42.66%) were found positive for mastitis, while 172 animals (57.33%) were recorded as healthy. Among the mastitis-positive animals, subclinical mastitis constituted the major proportion, affecting 93 buffaloes (31%), whereas clinical mastitis was observed in 35 buffaloes (11.66%) (Table 4.1). The predominance of subclinical mastitis over the clinical form highlights its epidemiological importance and agrees with earlier reports indicating that subclinical mastitis remains largely undetected under field conditions.

District-wise analysis revealed a higher overall prevalence of mastitis in Ayodhya district, where 72 cases (48%) were recorded, compared to 56 cases (37.33%) in Amethi district. Subclinical mastitis was more prevalent in Ayodhya (53 cases; 35.33%) than in Amethi (40 cases; 26.66%). Similarly, clinical mastitis cases were slightly higher in Ayodhya (19 cases; 12.66%) as compared to Amethi (16 cases; 10.66%). The higher prevalence observed in Ayodhya may be attributed to differences in management practices, housing hygiene, climatic conditions, and milking procedures. Hot and humid environmental conditions coupled with inadequate udder hygiene are known to favour the persistence and transmission of mastitis-causing pathogens. The results are depicted in Table 1 and Fig 1.

Table 1: District wise prevalence of mastitis in buffaloes

District	Total Animals Screened	Subclinical Mastitis (SCM)	Clinical Mastitis	Overall Prevalence
Ayodhya	150	53 (35.33%)	19 (12.66%)	72 (48%)
Amethi	150	40 (26.66%)	16 (10.66%)	56 (37.33%)
Total	300	93 (31%)	35 (11.66%)	128 (42.66%)

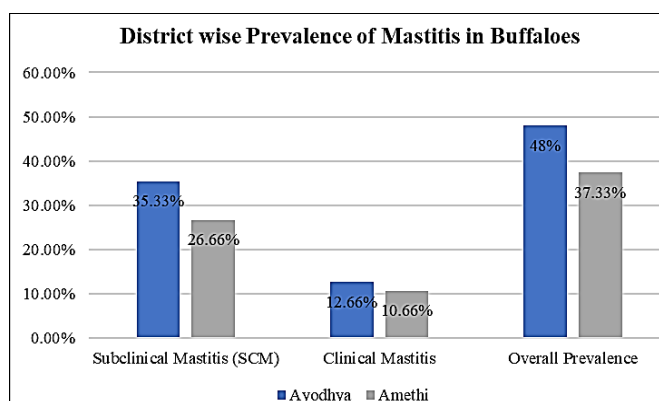
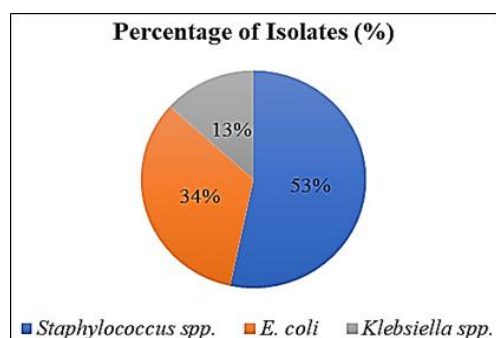


Fig 1: District wise prevalence of mastitis in buffaloes

Out of the 300 milk samples screened, 93 samples were positive for subclinical mastitis. From these positive samples, 30 representative samples were selected for microbiological examination. Bacterial isolation and identification revealed that *Staphylococcus* spp. were the most predominant pathogens, isolated from 53.33% (16/30) of samples, followed by *Escherichia coli* in 33.33% (10/30) and *Klebsiella* spp. in 13.33% (4/30) of samples. The predominance of *Staphylococcus* spp. is consistent with earlier findings and indicates the importance of contagious pathogens in the etiology of mastitis under field conditions. The isolation of environmental pathogens such as *E. coli* and *Klebsiella* spp. suggests the role of poor sanitation, contaminated housing, and unhygienic milking practices in the occurrence of mastitis. The results are depicted in Table 2 and Fig 2.

Table 2: Prevalence of different bacterial isolates in milk samples

Different bacterial isolates	Number of Isolates	Percentage of Isolates (%)
<i>Staphylococcus spp.</i>	16	53.33
<i>E. coli</i>	10	33.34
<i>Klebsiella spp.</i>	4	13.33
Total	30	100

**Fig 2:** Prevalence of different bacterial isolates in milk samples

The findings of the present study clearly demonstrate that mastitis, particularly the subclinical form, is widely prevalent in buffaloes and contributes to significant hidden economic losses due to reduced milk yield and compromised milk quality. The observed pathogen profile further emphasizes the need for regular screening of dairy animals, improved hygienic practices, and rational use of antimicrobials based on antibiogram studies. Effective control measures and farmer awareness programs are essential to reduce the burden of mastitis and improve udder health in buffaloes.

Conclusion

The present study concludes that mastitis is highly prevalent among buffaloes in the Ayodhya and Amethi districts, with an overall prevalence of 42.66%. Subclinical mastitis constituted the major proportion of cases, highlighting its significant epidemiological and economic importance due to its asymptomatic nature and prolonged impact on milk production and quality. The higher prevalence observed in Ayodhya district compared to Amethi indicates the influence of management practices, environmental conditions, and hygiene standards on disease occurrence. Microbiological analysis revealed *Staphylococcus spp.* as the predominant mastitis pathogen, followed by *Escherichia coli* and *Klebsiella spp.*, suggesting the involvement of both contagious and environmental sources of infection. The findings emphasize the need for routine screening of dairy buffaloes for subclinical mastitis, adoption of improved milking hygiene, and implementation of targeted control strategies based on pathogen profiling. Strengthening farmer awareness and preventive management practices is essential for effective mastitis control and improvement of udder health in buffaloes.

Conflict of interest

The authors declare that there is no conflict of interest in the publication of this article. All authors have reviewed the final manuscript and provide their full consent for publication.

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