

A Preliminary Study on Prevalence of Bovine Mastitis in Dharwad Region (North Karnataka), India



Zoology

KEYWORDS : Bacteria, Bovine mastitis, Histopathology, Microorganisms

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ABSTRACT

In the present study, an attempt has been made to isolate, identify the bacterial species from infected bovine udder tissues and the histopathological assessment of mild, acute, chronic and fatal stages. The collected mammary tissue samples were subjected to microbiological and histopathological examination. Staphylococcus spp, E.coli, Streptococcus spp, S. dysagalactiae S. agalactiae, Bacillus spp, Proteus spp, Serratia spp, S. pneumoniae, S.uberis, S. subtilis, Klebsiella spp, Corynebacteria and Mycoplasm bacterial species were identified. Staphylococcus spp showed highest occurrence (39.16%) followed by E.coli (31.66%), Streptococcus spp (12.5%) and followed by other species. Histological examination demonstrated considerable reduction in alveolar epithelial and luminal areas and increase in connective tissue stroma and leukocytes, illustrating limited development and shows inflammation of infected tissue. The prevalence of these contagious and natural bacterial species in the present study is probably due to the poor hygienic condition in the herds. The present study provides baseline information on bovine mastitis in this region.

Introduction

Mastitis is the inflammation of the udder tissue in mammals, the most of which is caused by the bacteria but some of which can be the consequence of yeast, fungal or even algal infection. This disease has effects on the economic growth of the herd's dairy farmers. The several causal agents and predisposing factors have been attributed to dairy cow mastitis with contagiously mainly by *Staphylococcus spp* and naturally like *Escherichia coli* as the main aetiological agent (Ibrahim et al., 2009). Predisposing factors such as poor management and hygiene, teat injuries and faulty milking machines are known to hasten the entry of infectious agents and the course of the disease (Majic et al., 1993). Mastitis in heifers poses a potential threat to milk production and udder health since the development of the milk secretory tissue occurs mainly during the first pregnancy, affecting future lactations (Vlieghe et al., 2012). Heifer mastitis has been extensively studied over the past decades (Oliver et al., 1983; Piepers et al., 2010). It may be concluded from bacterial pathogens and risk factors associated with mastitis effects on the trend of both clinical and subclinical mastitis increases with increasing age, number of uniformed and litter size frequency was also higher in early lactation stage (Islam et al., 2011). In the present literature review, very limited information on bovine mastitis diseases in different region of India is available. Therefore, the present study was undertaken to isolate, identify the bacterial pathogens and to determine, In different cattle breeds and same extent of histopathological damage of *Staphylococcus spp* infected mammary gland in different stage of mastitis, in Holstein- Friesian cow.

Materials and Methods

Collection and microscopic examinations of the material

A total of 120 infected tissue, approximately of 2.0 cm³ sizes samples from Holstein- Friesian, Jersey and local breed cows; buffaloes of different age groups were collected from the slaughter houses in Dharwad, Karnataka, India during the years 2011-2013. microscopic inspection of the surface area of the infected udder was done immediately after slaughter.

Microbiological & histopathological examinations

The dissected mammary glands were placed in pestal tubes containing 2 ml of phosphate buffer saline (PBS) and ground to an even tissue suspension for microbiological examination. Dilutions (10-fold) were prepared in PBS and triplicate volumes of each dilution were transferred on to calf blood agar plates which were incubated at 37°C for 24 to 30 h. Colonies were counted by the Gram stain method and the number of bacteria per gland were calculated. For histological examination, the mammary

glands were fixed in 4% paraformaldehyde, embedded in paraffin, and 5µ thickness sections were taken. The sections were stained with haematoxylin and eosin. The stained slides were photographed for assessment of histopathological changes.

Results

The highest founded bacterial frequencies of isolates from tissue were coagulase positive *Staphylococcus spp* and in these most were found *Staphylococcus aureus*, followed by *E. coli* and *streptococcus* infection of coagulase negative *Staphylococcus*. The majority bacterial isolates from clinical cases were in decreasing order as coagulase negative *Staphylococcus*, *Streptococcus spp*, *Bacillus spp*, *S. aureus* and other bacteria and *Mycoplasma*. The percentage of microorganism was identified as *Staphylococcus spp* (39.16%), *E.coli* (31.66%), and followed by *streptococcus spp* (12.50%), these are most time found *S. subtilis*, *S. pneumoniae* microorganisms. Other than these some *Bacillus spp*, *Proteus spp*, *S.uberis*, *Mycoplasma Corrynebacteria* are rarely found Table (1). Our Histological study shows mainly coagulase positive *Staphylococcus spp* of *S. aureus* in different mastitis stages such as mild, acute, chronic and fatal stage of mastitis, as compared with non infected cow mammary gland shows an extensive form of alveolar epithelial cells, luminal cells and moderate form of connective tissue. Histological examination of mammary in infected tissues demonstrated remarkable reduction of alveolar epithelial cells and luminal cells and increase in connective tissue stroma and leukocytes, illustrating limited development and inflammation of infected tissue (Figure 1).

Discussion

In the present study, all the tissue samples collected were found positive for mastitis signs. The higher percentages of *Staphylococcus spp*, *E.coli* and followed by other species in the present study are relatively similar to the previous reports (Waage et al., 1999, Junaidu 2011 and Kaliwal et al.,2011). Mastitis is a result of interaction between three elements like bacteria, cow and environment. *Staphylococcus* is a major pathogenic bacteria which survive on the skin of the udder and can infect the udder via the teat canal or any wound (Junaidu et al., 2011). Further, the prevalence of contagious microorganism species in the present study may be due to the poor hygienic condition in the herds. The various histopathological studies since last four decade showed damage to secretory tissue in mammary gland caused by mastitis pathogens (Benites et al., 2002). In this study, the reduction in alveolar epithelial and luminal areas and increases in connective tissue stroma and leukocytes, are observed, which supports the reports of a different stage of mastitis to determine

the cow's recovery state of the immune system.

Acknowledgements

The authors are grateful to DBT- KUD IPLS program for providing the financial assistance and Department of Zoology Karnatak University Dharwad for infrastructure facilities.

Table -1. Percentage of microorganisms isolated from bovine mastitis affected mammary gland in Dharwad region.

Organisms	No. of Samples	Percentage
<i>Staphylococcus spp</i>	47	(39.16)
<i>Coagulase positive e staphylococcus</i>	13	(10.83)
<i>Coagulase negative staphylococcus</i>	34	(28.33)
<i>Streptococcus spp.</i>	15	(12.50)
<i>S. dysagalactiae</i>	5	(4.16)
<i>S. agalactiae</i>	10	(8.33)
<i>E.coli</i>	38	31.66)
<i>Proteus spp</i>	4	(3.33)
<i>Serrate spp</i>	1	(0.83)
<i>S.uberis</i>	3	(2.50)
<i>Mycoplasma</i>	1	(0.83)
<i>Corrymbacteria</i>	1	(0.83)
<i>Bacillus spp</i>	6	(5.00)
<i>S. Septilus</i>	1	(0.83)
<i>S. pneumoniae</i>	1	(0.83)
<i>Klebsiella spp</i>	2	(1.66)

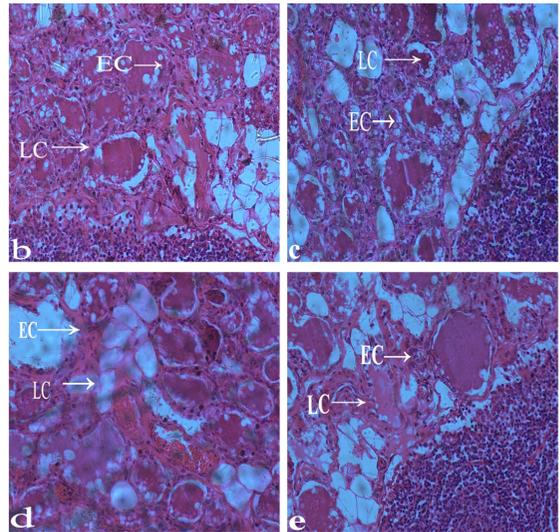
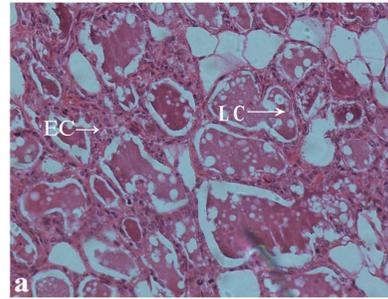


Fig-1 Hematoxylin and eosin stained sections of cow mammary gland infected with *S. aureus* a) control (non infected), (b)mild stage of mastitis,(c) acute stage of mastitis, (d) chronic stage of mastitis, and (e) Fatal stage of mastitis, shows extensive tissue damage of Luminal cells(LC) and Epithelial cells(EC) mammary glands. Under the magnifications of 20X.

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