Prevalence and Antibacterial Susceptibility in Mastitis in Buffalo and Cattle in District Lahore-Pakistan

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Absrtract: A total of 450 milk samples including both 272 buffalo and 178 cattle were randomly collected in and around District Lahore to study the incidence of mastitis and antibiotic sensitivity by performing Culture and Sensitivity test. The prevalence of mastitis in buffalo was found 20.98% while in cattle 24.71%. The prevalence of both Clinical and subclincal mastitis in buffalo were 40.35%, 59.64% and in cattle 61.26%, 30.63% respectively. The milk samples mixed with both mucus and blood in buffalo and cattle were 5.51% and 4.49% respectively. Quarters wise prevalence was 47.72%, 11.36%, 36.36% and 4.54% in the left fore, left hind, right fore and right hind quarters in cattle while In buffaloes, the prevalence was 0%, 68.96%, 11.49% and 19.54% in the left fore, left hind, right fore and right hind quarters respectively. The Ciprofloxacin antibiotic was found highly Sensitive in buffalo while Gentamicin in cattle.

Keywords: Antibiotic, buffalo, cattle, fore quarter, hind quarter, incidence, mastitis.

INTRODUCTION

Mastitis is considered to be the most costly disease of dairy animals worldwide. This disease complex is the outcome of interaction of various factors associated with the host, pathogens and the environment. Buffalo and cattle are mostly reared for milk production and the disease “Mastitis” renders them useless for this purpose. It is one of the most important reasons for termination of lactation and unwanted culling of dairy buffalo [1]. It is a multifactor and the most costly disease of the dairy industry throughout the world [2] that affects both quality [3] and quantity of milk [4]. Field surveys of major livestock diseases in Pakistan have indicated that mastitis is one of the most important diseases of dairy animals in the country [5]. In Pakistan, owing to small herd sizes, the animals are predominantly hand-milked. Infectious agents of mastitis may be transmitted from infected to un-infected animals through milker’s hand [6]. The infection originates either from the infected udder or the contaminated environments.

The major sources of pathogens and means of transmission include infected quarters and soiled udder, contaminated milking machines, teat cups, milker’s hands, washing clothes, flies and surgical instruments. Moreover, the stage of lactation, lactation number, trauma to udder, teat and teat canal, loose teat sphincters, lesions on teat skin, immunological status of each mammary gland, bulk of infection in the environment and managemental conditions are amongst the determinants which dictate the level of mastitis incidence [7].

The present study was designed to determine the prevalence of mastitis, quarter/teat of udder involved and the treatment with better antibiotics in dairy buffaloes and cattle.

MATERIALS AND METHODS

A total of 450 animals (n=272 buffaloes; n=178 cattle) of 50 randomly selected livestock farmers were screened to find out the prevalence of clinical and sub-clinical mastitis. Milk samples were also brought to the laboratory from diseased animals not treated with antibiotics were immediately cooled and transported to Provincial Diagnostic Laboratory, L&DD, 16-Cooper Road, Lahore in the ice box for microbiological examination. Clinical mastitis was diagnosed when there were visible or palpable signs of udder inflammation along with the changes in milk secretions whereas subclinical mastitis was diagnosed by using the Surf Field Mastitis Test (SFMT) [8]. A comprehensive questionnaire focused on data related to cattle and buffaloes, host and managerial determinants/risk factors associated with mastitis was completed in the presence of each livestock farmer whose animal was selected for the present study.

Microbiological Examination

Microbiological examination of milk samples begin within 8 hours of collection. Procedure described by National Mastitis Council Inc., USA [9] was followed for the collection of milk samples. After discarding the first few streams, about 10 ml of milk was collected aseptically for culturing the milk samples and

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Table 1: Prevalence of Mastitis in Buffalo and Cattle in District Lahore

Species	No. of animals examined	No. of affected animals	Mastitis Prevalence (%)
Buffalo	272	57	20.95
Cattle	178	44	24.71
Total	450	101	22.44

identification of mastitis pathogens. The samples were shaken eight times to get a uniform dispersion of the pathogens. Using a platinum-rhodium loop, 0.01 ml of milk sample was streaked each onto Nutrient agar plate. Milk samples were cultured on a 100 mm plate by plating and incubated at 37°C for 48 hours. The colonies of the microorganisms were isolated and with platinum loop mixed in distilled water and than merse on Petri dish with antibiotics disks. Eight Different antibiotics i.e. Gentamicin, Ciprofloxacin, Norfloxacine, Ampicillin, Streptomycine, Chloramphenicol, Pencillin and Amoxicillin were used for the treatment of mastitis and their efficacy study. These antibiotics were injected intra-muscularly at the dose rate of 1ml/10kg live body weight of the animal.

The data was statistically analyzed by applying Percentage.

RESULTS AND DISCUSSION

In the present study, the overall prevalence of mastitis was found 22.44% including 24.71% in cattle and 31.75% in buffaloes (Table **1**). The overall prevalence of mastitis was lower in buffaloes as compared to the crossbred cattle. This lower prevalence might be attributed to the tighter teat sphincter of buffaloes as compared to that of cattle [10]. There was higher incidence in hindquarters in buffaloes than crossbred cattle and among hindquarters, right hindquarters were found to be more susceptible. Iqbal [11] reported that the prevalence of hind quarters was higher in hindquarters as compared to the forequarters and slightly higher in right quarters than left ones. In case of forequarters, both species were equally affected also reported by Rehman [12].

The prevalence of clinical mastitis in cattle was reported to be 61.36% while in buffaloes the prevalence of clinical mastitis was 40.35% (Table **2**). These findings are in close alignment with the findings of Bilal *et al.* [13] with the results of present study. The prevalence of sub-clinical mastitis was also found higher in buffaloes 59.64% than in cattle 30.63%. Dangore *et al*. [14] reported low prevalence of subclinical mastitis in dairy cattle, which is in accordance with the findings of present study.

Table 2: Types of Mastitis in Buffalo and Cattle in District Lahore

Species	Clinical	Sub clinical
Buffalo (n=57)	23 (40.35%)	34 (59.64%)
Cattle (n=44)	27 (61.36%)	17 (30.63%)
Total (N=101)	50 (49.50%)	51 (50.49%)

In mastitis, there is drastic change in the milk, taste and consistency. In sub clinical there was bad taste and odor, in second stage, there was watery discharge, in third stage, mucus mixed with milk and in fourth stage, blood mixed with milk from the effected teat which resulted in culling of animal if not properly treated. The changes in the milk due to mastitis are shown in Table **3**. The Milk with bad taste and odor was found 8.08% in buffalo and 6.74% in cattle. The milk mix with mucus and blood was reported 6.61% & 7.35% in buffalo and in cattle 7.35% & 5.61% while milk with mixed mucus and blood was 5.51% in buffalo and 4.49% in cattle respectively. These findings are in agreement to that reported by Muhammad *et al*. [8]

Quarter-based prevalence of clinical mastitis in cattle and buffaloes were also determined. The prevalence of clinical mastitis in relation to quarters was determined, it was found that prevalence was higher in fore quarters than in rear quarters in cattle and it was higher in rear quarters than in fore quarters in buffaloes. Prevalence was 47.72%, 11.36%, 36.36% and 4.54% in the left-fore, left-rear, right-fore and right-rear quarters, respectively, in cattle. In buffaloes, the prevalence was 0%, 68.96%, 11.49% and 19.54% in the left fore, left rear, right fore and right rear quarters, respectively (Table **4**).

Prevalence of hind quarters was higher in buffaloes than in cattle. It was 1.11% and 1.41% in cattle and buffaloes, respectively. When the prevalence of hind quarters in relation to anatomical location of quarters was determined, it was found that prevalence was

Table 3: Physical Characters of the Milk

Species	Normal	Bad Taste and Odor	Watery	Mucous	Blood	Mucus mix with Blood
Buffalo (n=272)	185 (68.01%)	22 (8.08%)	12 (4.41%)	18 (6.61%)	20 (7.35%)	15 (5.51%)
Cattle (n=178)	122 (68.53%)	12 (6.74%)	8 (4.49%)	18 (4.49%)	10 (5.61%)	8 (4.49%)
Total (N=450)	307 (68.22%)	34 (7.55%)	20 (4.44%)	36 (8%)	30 (6.66%)	23 (5.11%)

Table 4: Quarter-Wise Incidence of Mastitis in Buffalo and Cattle

Species	Left Fore Quarter	Right Fore Quarter	Left Hind Quarter	Right Hind Quarter
Buffalo (n=87)	(0%)	10 (11.49%)	60 (68.96%)	17 (19.54%)
Cattle (n=44)	21 (47.72%)	16 (36.36%)	5 (11.36%)	2 (4.54%)

Table 5: Antibiotic Response Using CST for the Treatment of Mastitis in Buffalo and Cattle

Species	Gentamicin	Ciprofloaxcin	Norfloxacine	Enorfloxacin	Ampicillin	Streptomycine	Chloramphenicol	Pencillin	Amoxicillin
Buffalo (n=87)	S	H.S	S	R	R	R	R	R	R
Cattle (n=44)	H.S	S	S	R	R	R	R	R	R

HS= Highly Sensitive; S= Sensitive; R= Resistant; CST=Culture and Sensitivity test.

higher in fore quarters than in rear quarters in cattle and it was higher in rear quarters than in fore quarters in buffaloes. Prevalence was 0.46%, 0.19%, 0.27% and 0.19% in left fore, left rear, right fore and right rear quarters, respectively in cattle. In buffaloes the prevalence was 0.20%, 0.47%, 0.27% and 0.47% in left fore, left rear, right fore and right rear quarters, respectively. The slightly higher prevalence of hind quarters in buffaloes might be due to the high incidence of clinical mastitis in buffaloes as advanced untreated cases of mastitis could lead to teat hindness.

Shukla *et al*. [15] reported that forequarters were more affected than hind quarters in the case of cattle where in buffaloes hind quarters had higher prevalence of mastitis than forequarters, which supported the findings of present study. Similar findings were observed by Bilal *et al*. [13] and Premchand *et al.* [16] who reported a higher prevalence of mastitis in hind quarters of buffaloes than in fore quarters. The findings of the present study do not correlate with the findings of Ahmad [17].

Ciprofloxacin was found highly sensitivity in buffalo and gentamicin in cattle while Norfloxacin Sensitive in both buffalo and cattle by performing the Culture and Sensitivity test. It was found that all other antibiotics shown resistant to the bacteria (Table **5**). These findings are in agreement with findings of Mustafa *et al*. [18] and Sumathi *et al*. [19] also found genatmycin effective while Guerin *et al.* [20] and Gianneechini *et al.* [21] found gentamicin resistant.

CONCLUSION

It was concluded from present the study that prevalence of clinical and subclinical mastitis was higher in hindquarters than forequarters and among hindquarters, left hindquarters were more susceptible than the right. The Ciprofloxacin antibiotic was found highly sensitive in buffalo while Gentamicin in cattle.

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