

## PREVALENCE AND ANTIBACTERIAL SUSCEPTIBILITY IN MASTITIS IN BUFFALO AND COW IN DISTRICT LAHORE-PAKISTAN

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## ABSTRACT

A total of 450 milk samples including both 272 buffalo and 178 cow 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 to be 20.98% while that in cow was 24.71%. The prevalences of both clinical and subclinical mastitis in buffalo were 40.35% and 59.64%, respectively, and those in cow were 61.26% and 30.63% respectively. The milk samples mixed with both mucus and blood in buffalo and cow were 5.51% and 4.49%, respectively. Quarter-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 cow 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. Ciprofloxacin was found highly sensitive in buffalo while gentamicin was found highly sensitive in cow.

**Keywords:** antibiotic, buffaloes, *Bubalus bubalis*, cow, antibiotic, incidence, mastitis

## INTRODUCTION

Buffalo and cattle are mostly reared for milk production, and the disease mastitis renders them useless for this purpose. Milk production usually decreases and blood alone or mixed with mucus come with the milk. It is one of the most important reasons for termination of lactation and unwanted culling of dairy buffalo (McDowell *et al.*, 1995). 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. The productive efficiency of dairy animals is adversely affected by suboptimal management, poor nutrition and various diseases, in particular mastitis, which is one of the most important impediments confronting economic milk production in Pakistan. It is the most costly disease of the dairy industry throughout the world (DeGraves and Fetrow, 1991) that affects both quality (Barbano, 1989) and quantity of milk (Arshad *et al.*, 1995). 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 (Hussain *et al.*, 2005). Mastitis is the outcome of the interaction of various

factors associated with the host, the pathogen(s) and the environment.

In Pakistan and other developing countries owing to small herd sizes, dairy animals are predominantly hand-milked. Infectious agents of mastitis may be transmitted from infected to uninfected animals through the milker's hand (Oliver, 1975) especially because milk is often used as a lubricant for milking. Mastitis in hand-milked cows was nearly twice as frequent as in machine-milked ones (25.1 VS 14.6%) Motie *et al.* (1985).

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 managerial conditions are amongst the determinants which dictate the level of mastitis incidence (Radostits *et al.*, 2000).

Clinical mastitis is an individual problem and it is characterized by changes in the udder and milk drawn from it. Whereas, subclinical mastitis is herd problem because it constitutes a reservoir of infection which could be transmitted to other animals of the herd. The frequency, severity, and economic impact of mastitis are known to depend upon the preventive and management approaches. It has also been observed that the incidence and the patterns of causative agents markedly differ from place to place, herd to herd, and time to time. Studies conducted in different states within India reflect high incidence of the disease for past seven decades.

The present study was, therefore designed to determine the frequency distribution of mastitis in dairy buffaloes and cows and to determine the association of some host and pathogen(s) related determinants with the disease.

## MATERIALS AND METHODS

A total of 450 animals (n=272 buffaloes n=178 cattle) of 50 randomly selected livestock farmers were screened to find the epidemiology of clinical and sub-clinical mastitis in the study area. Milk samples were also brought to the laboratory from diseased animals not treated with antibiotics, immediately cooled, and transported to the Provincial Diagnostic Laboratory, L&DD, 16-Cooper Road, Lahore in an 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) (Muhammad *et al.*, 1995). 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 began within 8 h of collection. The procedure described by National Mastitis Council Inc., USA (1990) was followed for the collection of milk samples. After discarding the first few streams, about 10 ml of milk was collected aseptically. The procedures described by National

Mastitis Council Inc., USA (1987) were followed for culturing the milk samples and 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 MacConkey's agar plate. Milk samples were cultured on a 100 mm plate by plating and incubated at 37°C for 48 h. The Guidelines of National Mastitis Council Inc (1987) on the significance of colony numbers in pure or mixed cultures were used to categorize a sample as infected or contaminated. The colonies of the microorganisms were isolated and with platinum loop mixed in distilled water and then spread on Petri dishes with antibiotic disks. Eight different antibiotics, i.e. gentamycin, ciprofloxacin, norfloxacin, ampicillin, streptomycin, chloramphenicol, penicillin and amoxicillin were used for the treatment of mastitis and their efficacy was studied. These antibiotics were injected intramuscularly at the dose rate of 1 ml/10 kg 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 cow and 31.75% in buffaloes (Table 1). The overall prevalence of mastitis was lower in the buffaloes as compared to the crossbred cows. This lower prevalence might be attributed to the tighter teat sphincter of buffaloes as compared to that of cows (Uppal *et al.*, 1994). There was higher incidence in hindquarters in buffaloes than crossbred cows and among hindquarters, right hindquarters were found to be more susceptible. Iqbal (1992) 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 as also reported by Rehman (1995).

The prevalence of clinical mastitis in cow 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 Nooruddin *et al.* (1997) and Bilal *et al.* (2004). The prevalence of sub-clinical mastitis was also found higher in buffaloes (59.64%) than in cows (30.63%). Dangore *et al.* (2000) and Allore (1993) reported low prevalence of subclinical mastitis in dairy cows, which is in accordance with the findings of present study.

In mastitis, there is drastic change in the milk, taste and consistency. In sub-clinical mastitis, there was bad taste and odor; in the second stage, there was a watery discharge; in the third stage, mucus mixed with milk, and in the fourth stage, blood mixed with milk from the affected teat, which resulted in culling of animal if not properly treated. The changes in the milk due to mastitis are shown in Table 3. Milk with bad taste and odor was found 8.08% in buffalo and 6.74% in cow. Milk mixed with mucus and blood was recorded 6.61% and 7.35% in buffalo and in cow 7.35% and 5.61% while milk with mixed mucus and blood was 5.51% in buffalo and 4.49% in cow, respectively. These findings are in agreement to those reported by Khan and Muhammad (2005).

Quarter-based prevalence of clinical mastitis in cow 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 cow 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-

Table 1. Prevalence of mastitis in buffalo and cow in district Lahore.

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

Table 2. Types of mastitis in buffalo and cow in district Lahore.

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

Table 3. Physical characters of the milk.

| Species         | Normal       | Bad Taste and Odor | Watery     | Mucus     | 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%)            |
| Cow (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 cow.

| 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%)        |
| Cow (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 cow.

| Species           | Gentamicin | Ciprofloaxcin | Norfloxacine | Enorfloxacine | Ampicillin | Streptomycine | Chloramphenicol | Pencillin | Amoxicillin |
|-------------------|------------|---------------|--------------|---------------|------------|---------------|-----------------|-----------|-------------|
| Buffalo<br>(n=87) | S          | H.S           | S            | R             | R          | R             | R               | R         | R           |
| Cow<br>(n=44)     | H.S        | S             | S            | R             | R          | R             | R               | R         | R           |

HS = Highly Sensitive

S = Sensitive

R = Resistant

CST = Culture and Sensitivity test

fore, left-rear, right-fore and right-rear quarters, respectively, in cow. 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 cow. It was 1.11% and 1.41% in cow and buffaloes, respectively. When the prevalence of hind quarters in relation to anatomical location of quarters was determined, it was found that prevalence was higher in fore quarters than in rear quarters in cow 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 cow. 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 blindness Shukla *et al.* (1997) reported that forequarters were more affected than hind quarters in the case of cows 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.*, 2004; Allore, 1993; Premchand *et al.*, 1995) 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 *et al.* (1991).

Ciprofloxacin was found to have high sensitivity in buffalo, and gentamicin was found to have high sensitivity in cow while norfloxacin was found to have sensitivity in both buffalo and cow 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.*, 2007. Sumathi *et al.*, 2008 also found gentamicin effective while Guerin *et al.*, 2002; Giannechini *et al.*, 2002; Ebrahimi *et al.*, 2002; Erskine *et al.*, 1986 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.

With the advent of improved diagnostic tests, more understanding of the disease and availability of third generation antibiotics, and improved ways and means to upkeep the hygiene and management, the opportunities for clean milk production in periurban areas are increasing.

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