

IMPACT OF CLINICAL MASTITIS IN DAIRY FARMING AT KESHABPUR UPAZILLA IN JESSORE IN BANGLADESH

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ABSTRACT

The study was conducted at upazilla veterinary hospital, Keshabpur, Jessore during the period of March 2013 to August 2013 to estimate the impact of clinical mastitis in dairy cows. Clinical mastitis was diagnosed on the basis of clinical signs and strip cup test (SCT). A total of 432 cases of dairy animals were recorded among them 65 cases were mastitis. The overall prevalence of mastitis was 15.05%. The prevalence of mastitis was 12.04% and 3.01% in cows and does respectively. In doe, the prevalence was 7.14% in Jamunapari goat and 4.46% in Black Bengal goat. Reproductive stages enhanced the prevalence of mastitis. The prevalence of mastitis was also significantly affected by floor conditions where 10.42% in cows and 8.04% in does in the farms with brick-block floor and 6.51% in cows and 3.57% in does with soil floor. The efficacy of Ceftriaxone and amoxicillin was better than gentamicin and streptomycin. Hygienic condition showed lower prevalence of mastitis 1.63% and 1.79% in cow and does respectively than the unhygienic farm.

Keywords: Clinical mastitis, SCT, cross breed, breed

INTRODUCTION

The term “Mastitis” is derived from Greek word “matos” which means “breast” (mammary gland) and “itis” means Inflammation. Mastitis is the inflammation of the parenchyma of the mammary gland regardless of cause. It is characterized by a range of physical and chemical changes in the milk, and pathological changes in the glandular tissue (Atakan, 2008). The most important changes in the milk include discoloration, the presence of clots and the presence of large number of leukocytes (Hameed *et al.*, 2012). There is swelling, heat, pain and in duration in the mammary gland in many clinical cases. However, a large proportion of mastitic glands are not readily detectable by manual palpation or by visual examination of the milk using a strip cup (Mbilu, 2007). Mastitis is one of the most devastating diseases in the dairy industry. Economic consequences of mastitis, clinical or sub-clinical, include reduced milk yield, poorer quality milk, increased culling rate and increased cost of veterinary services and medicine. Dairy farmers in Bangladesh are not always aware of the best practices to control mastitis (Rahman *et al.*, 2009).

Economic loss to mastitis in the United States is estimated to be approximately (\$185)/cow annually. If we assume the same milk price and this value is multiplied by the total number of milking cows (9.5 million)/ head, the total annual cost of mastitis is about (\$1.8) billion. This is approximately 10% of the total value of farm milk sales, and about two-thirds of this loss is due to reduced milk production in sub clinically infected cows (Sargeant *et al.*, 2001). The average production loss per lactation for one infected quarter is about 1600 pounds. Other losses are due to discarded abnormal milk and milk withheld from cows treated with antibiotic, costs of early replacement of affected cows, reduced sale value of culled cows, costs of drugs and veterinary services, and increased labor costs (NMC, 1999). The primary cause of mastitis in cattle, goats and sheep are well-recognized groups of microorganisms such as *Streptococcus* sp., *Staphylococcus* sp., *Pasteurella* sp. and *Escherichia coli*, *Enterobacter* sp. and *Klebsiella* sp. Recent studies at the University of Missouri collected data on the incidence of subclinical mastitis in ewes and identified *Staphylococcus* sp, *Streptococcus* sp and *Micrococcus* sp found in bacterial cultures (Lalrintluanga *et al.*, 2003; Rahman *et al.*, 2010). The source of infection is contagious pathogens, environmental pathogens and other pathogens (Khan and Muhammad, 2005). Mastitis is caused by many different infectious agents commonly divided into Contagious pathogens (*Streptococcus agalactiae*, *Staphylococcus aureus*, *Mycoplasma bovis*) causing contagious mastitis and Environmental pathogens (*Streptococcus uberis*, *Streptococcus dysgalactiae* are most prevalent and Gram negative bacteria *Escherichia coli*, *Klebsiella* sp., *Citrobacter* sp., *Enterobacter* sp. etc.) causing environmental mastitis (Radostits *et al.*, 2000).

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These are major pathogens. Some minor pathogens also causing mastitis including coagulase negative *Staphylococcus* spp. such as *Staphylococcus hyicus* and *Staphylococcus chromogenes* (Islam *et al.*, 2011b).

Although mastitis was known to occur markedly in dairy cows, it appears recently that the frequency has dramatically increased in small holder dairy farms. These were the points which initiated the study to be done on the topic of mastitis. Therefore, the main objective of this study was to know the prevalence of mastitis in relation to species, farm type, breed and hygienic condition. Also observe the effects of drugs (antibiotics) in response to mastitis in different species. This study justifies the economic impact of mastitis including how it varies in different settings and which measure should be done for the control or reduce the disease occurrence of mastitis.

MATERIALS AND METHODS

The study was conducted at upazilla veterinary hospital, Keshabpur, Jessore during the period of March 2013 to August 2013. A total of 432 cattle suffering with mammary gland disease were examined where 65 cases were mastitis. A case of clinical mastitis was diagnosed on the basis of clinical findings and strip cup test (SCT). Udders and milk were examined to identify clinical mastitis. Clinical findings observed inflammatory udder redness, heat, swelling and pain. The milk could vary from having a few milk clots (garget) to serum with clumps of fibrin in the secretion, The mammary gland was edematous or very hard on palpation and The milk looked watery serous or purulent. Mainly mastitis was diagnosed based on clinical signs. But for the Strip cup test, Milk samples were collected aseptically from individual affected quarter of udder. Before taking samples the history of the milch animal and clinical signs was recorded through questionnaire.

Strip cup test (SCT)

The strip cup consists of a flat enamel plate partitioned into an area. The plate is black in color so that clot is clearly visible. Besides enamel plate this test can be done in a bowel covering a black cloth. At first udder was cleaned and wiped with clean cloth soaked in disinfectant→ then udder was allowed to dry→ milk was collected directly in sterile tube and labeled and then poured on black cloth above the enamel plate→ then observed the clots or flakes.

Statistical analysis

Data were analyzed by Chi-square test to observe the significant influence of different prevalence, breed, quarters of udder, reproductive state, peri parturient disease, floor components, hygienic condition, treatment and breeds was determined by chi-square test using SPSS-11.5 computer package program.

RESULTS AND DISCUSSION

A total of 432 dairy animals were brought to upazilla veterinary hospital, Keshabpur, Jessore during the period of 6 months. Among them 52 cows and 13 does had been diagnosed as mastitis. The prevalence of mastitis is 12.04 % in cows and 3.01 % in does (Table 1).

Table 1. Prevalence of mastitis in different animals

Species	Total No of cases	Mastitis	Percentage (%)	Chi-square test (P-value)
Cows	307	52	12.04	0.000**
Does	112	13	3.01	
Ewes	13	-	-	

** Significant at $p < 0.01$

Goswami *et al.* (2003) reported that 13.33% prevalence of clinical mastitis in dairy cows but in this study this is lower (12.03%). Islam *et al.* (2011) found 19.9% mastitis in dry season. This finding is also vary with the observation of Dwivedi *et al.* (2004) who reported 16.72% prevalence of clinical mastitis in dairy cows at Pakistan. It is due to the population size, rearing system and breed of the species.

The prevalence of mastitis in compared with other diseases was presented in the Table 2 where 15.05% of lactating animals were affected in mastitis in compared with other disease 84.95%.

Table 2. Prevalence of mastitis in compared to other diseases

Diseases	No of cases (%)	Chi-square test (P-value)
Mastitis	65 (15.05)	0.000**
Other diseases (Milk Fever, Ketosis, Parasitic infestation etc.)	367 (84.95)	

** Significant at p<0.01

Table 3. Prevalence of mastitis in case of breeds of cow and goats

Types of breeds	No of cows	Prevalence (%)	Chi-square test (P-value)
Cross	39	12.7	0.000**
Local	13	4.23	
Jamunapari	08	7.14	0.000**
Local(BBG)	05	4.46	

** Significant at p<0.01

The results in the Table 3 were similar to the observations made by Barbosa *et al.* (2002) who recorded higher frequency of mastitis in cross breeds. The findings of other researchers indicated that high yielding cows are more prone to udder infection than low producing one (DaSilva *et al.*, 2004; Radostits *et al.*, 2000). Because the production of large quantity of milk keep the glandular tissue more generative and thus become more susceptible to infections. Cross breed cows produce more milk than the local zebus. Bigger size, long and pendulous udder in cross breed cow might have picked up more infection resulting higher rate of infection (Patel *et al.*, 2000). But the result due to improper hygienic condition and ignorance of the farmer.

Table 4. Number of quarters affected in mastitis

Quarter affected	No of cows (%)	No of does (%)	Chi-square test (P-value)
One quarter	28 (9.12)	08 (7.14)	0.000**
More than one	24 (7.81)	05 (4.46)	

** Significant at p<0.01

It has been shown that one quarter is more 9.12% affected than two or more number 7.81% of quarters in cows and 7.14% and 4.46% in does respectively (Table 4). Because in most cases mastitis starts with one teat infection, then it gradually spread to other teats (quarters). When treatment is performed the probability of infection to other teat is reduced. About 9.12% cows and 7.14% does were affected with one teat infection and 7.81% cows and 4.46% does affected with more than one quarters. The statement is quietly supported by Rainard and Riollot (2006) and Samad (2008) who reported that about 34% cows affected with one quarter affected. In both species the percentage of mastitis were higher in non-pregnant and lactating cows 14.98% and 100% in does and lactating animal that pregnant and lactating cows 1.95% and 0% in does (Table 5).

Table 5. Prevalence of mastitis on reproductive state

Reproductive state	No of cows (%)	No of does (%)	Chi-square test (P-value)
Pregnant and Lactating	6 (1.95)	-	0.000**
Non pregnant and lactating	46 (14.98)	13 (100)	

** Significant at p<0.01

In pregnant and lactating animal the amount of milk production is reduced due to lower amount of prolactin release and lower nutritional level because fetus takes a great part on nutrition. Moreover, low milk production is less prone to mastitis (Kader *et al.*, 2002; Sederevicius *et al.*, 2006) which is similar with this study. A total of 50 cows were affected with periparturient diseases. Cows without a history of periparturient disease had prevalence of 0.65% mastitis; in contrast, 16.28% of cows with a history of periparturient disease had mastitis (Table 6).

Table 6. Percentages of mastitis in cows with peri parturient diseases

Condition	Affected animals (%)	Chi-square test (P-value)
Cows without a history of periparturient disease	2 (0.65)	0.000**
Cows with a history of periparturient disease	50 (16.28)	

** Significant at p<0.01

The result is supported with (Seegers *et al.*, 2003). The lower immunity level of periparturient cows makes the cow more prone to infection in the udder (Rainard and Riollot, 2006). Once a cow gets infected or diseased during the periparturient period, it becomes more susceptible to udder infection due to lowered immunity (Sarker and Samad, 2011; Sharma *et al.*, 2007). Calcium ions are necessary for muscle constriction. As a result, in milk fever, low level of calcium decreases the rigidity of the teat sphincter that perhaps allows the organism to pass into the udder. In addition, cows having infected uterine discharge and retained placenta risk the udder and teats being contaminated (Zaki *et al.*, 2008).

Table 7. Mastitis of cow depending on floor component

Floor condition	Total cases: cows (%)	Total cases: does (%)	Chi-square test (P-value)
Brick block floor	32 (10.42)	9 (8.04)	
Soiled floor	20 (6.51)	4 (3.57)	0.000**

** Significant at p<0.01

Prevalence of mastitis depending on floor condition was 10.42% in cows and 8.04% in does in farms with brick-block floor and 6.51% in cows and 3.57% in does in farms with soil floor (Table 7). The prevalence of mastitis was also significantly affected by floor conditions (completely dry vs. partly or completely wet and soiled floor). This can be explained by the fact that farms with soil floor would dry more quickly than the brick floor (Sharma *et al.*, 2008). As a result soiled floor animal were less affected than brick block floor. But wet soiled floor (less absorbable) are most harmful for dairy animal to cause mastitis. It appeared that the floor was a potential source for mastitis organisms to enter the udder through the teat orifice (Wakwoya *et al.*, 2006).

Table 8. Mastitis in relation to hygienic condition of farm

Category	Total cases: cows (%)	Total cases: does (%)	Chi-square test (P-value)
Hygienic	5 (1.63)	2 (1.79)	
Unhygienic	47 (15.3)	11 (9.82)	0.000**

** Significant at p<0.01

Hygienic condition showed lower prevalence of mastitis 1.63%, 1.79% in cow & does respectively than the unhygienic farm (Table 8). This result of present study is supported with the findings of Sharma *et al.*(2010) who reported that the prevalence of mastitis were found to be highest in cows managed with lower drainage system.

It is indicated that 35 infected cows were treated with gentamicin (Table 9). Among them 30 (85.71%) cows were cured out of 35. A total of 10 infected cows and 5 not cured cows treated with ceftriaxone and finally all cows were cured. A total of 2 infected cows were treated with amoxicillin and all were cured (100%). A total of

5 cows treated with Streptomycin-Penicillin and all were cured (100%). Teat siphon (during block) and intramammary infusion was also used.

Table 9. Response to treatment in mastitis in case of cow

Antibiotics	No of animals	Cured (%)	Not cure (%)	Chi-square test (P-value)
Gentamicin	35	30 (85.71)	5 (14.29)	0.000**
Ceftriaxone	10+5 (not cured)	15 (100)	-	
Amoxicillin	2	2 (100)	0	
Streptomycin and Penicillin	5	5 (100)	-	

** Significant at $p < 0.01$

The statement was supported with Tanwar *et al.* (2001) who identified that *Staphylococcus spp* were the most commonly found pathogen. These isolates were sensitive to Gentamicin and Ceftriaxone. Sudhan *et al.* (2005) also stated that Neomycin, Chloramphenicol and nitrofurantoin were found to be most effective against mastitis pathogens. In addition with, pain killer (Diclofenac sodium or Ketoprofen) or sometimes Steroid (Dexamethason) and antihistaminic (Chlorphenaramine maleate) were used.

CONCLUSION

The study also showed that higher prevalence of clinical mastitis in large, lower, medium and backyard farm is due to management system as well as proper knowledge of dairy farming. A well documented continued research and educational effort is required to increase producer awareness to reduce mastitis in dairy enterprise.

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