

*Original Research***Studies on Prevalence and Epidemiological Risk Factors of Bovine Mastitis in and around Bhubaneswar, Odisha****R. K. Tripathy¹, P. K. Rath^{2*}, S. K. Panda³, B. P. Mishra⁴, B. Jena⁵ and D. K. Karna⁶**

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Abstract

In total, 234 numbers of cows housed in field conditions randomly screened for mastitis. Overall prevalence of subclinical mastitis (SCM) and clinical mastitis was found 32.48 % and 9.4 %. Statistical analysis of various epidemiological risk factors like body weight, age, milk yield, floor type, udder types, teat size, season, parity and stage of lactation showed a significant association in occurrence of mastitis in cows. Chi-square analysis resulted highest incidence of mastitis (36.73 %) in 5th parity. Rainy season showed an increased incidence with 62.24 % followed by 26.53 % in summer and 4.08 % in winter. Highest prevalence was seen in CBJ (70.41%) followed by HF (16.33 %) and lowest in Deshi non- descript breeds (13.27 %). Cows housed in earthen floor resulted maximum affections (48.98 %) followed by brick type (38.78 %) and lowest in concrete floor (12.24 %). Mastitis incidences were highest in cows with cup shaped udder (48.98 %), hind quarter (57.14 %) and right hind teats (40 %). The present study observed a significant increase of mastitis with older cows having more body weights.

Key words: Mastitis, Udder Type, Age, Breed, Season, Odisha

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Introduction

Mastitis is the inflammation of parenchyma of mammary gland and is one of the most widespread and damaging disease, hampering the expected growth of the dairy sector (Tripura *et al.*, 2014). Detail epidemiological study related to age, breed, season, floor type, udder type, parity, stage of lactation, milk

yield etc. done to find out any correlation in occurrence of mastitis which will guide the farmers as well as the clinicians to get rid of the disease. Observations of various risk factors and their association in incidences of mastitis in cows housed naturally in field conditions are of utmost important for the farmers to limit the disease process by adopting suitable hygienic and managerial practices in dairy farming through proper awareness.

Materials and Methods

Screening of Cows

In total, 234 numbers of cows comprising of various breeds and ages, domesticated in and around Bhubaneswar were included in the present research programme randomly screened for detection of mastitis on the basis of history from the owner about reduced milk yield, presence / absence of abnormality in milk such as flakes, clots, and watery milk, bloods or gels or precipitates in milk etc., presence / absence of clinical signs like udder redness, firmness and other systemic signs like fever, pyrexia and anorexia along with Somatic Cell Count (SCC) and Modified California Mastitis Test (MCMT) of the milk samples. A format of questionnaire pertaining information regarding age, breed, hygienic status and drainage system of the cow shed, milk yield of the affected cows, stage of lactation, parity, educational scenario of the animal owner, herd size etc. were collected and recorded in excel data sheet for statistical analysis by using SAS software package. Chi- Square test was done on some parameters which showed a significant ($p < 0.05$) association between various risk factors with increasing incidence of mastitis.

SCC and MCMT

In the present study, milk samples with average SCC of 2.5 – 4.0 lakhs/ml without any gross abnormality of udder considered as subclinical mastitis and more than 4.0lakhs/ml of SCC with presence of clinical signs related to udder gross pathological changes considered as clinical mastitis. Below 2.5 lakhs/ml of SCC without any obvious changes in milk as well as udder considered as normal and apparently healthy but non-mastitis cows. The rapidity and amount of gel formation or precipitate through MCMT is measured qualitatively to assess the degree of mastitis. Result was seen within 15 seconds as a negative, 1, 2, or 3 reactions depending on the amount of gel formed in the sample.

Result and Discussion

In total, 234 numbers of cows housed in and around Bhubaneswar were included in the present research programme screened for mastitis over a period spanning about one year i.e. June 2016 to Mid July 2017. The cows were screened for mastitis on the basis of history, clinical signs, SCC and MCMT. During the study, 98 cows screened positive for mastitis giving an incidence of 41.88 %. The cows (n=22) with

presence of clinical signs like redness, inflamed along with firmness of udder, bloody or clotted or flakiness in milk, high SCC and high MCMT score (more than 2) etc. were categorised under clinical mastitis which was only 22.54 % out of 98 mastitis cows. Rest of the cows (n=76) with no visible clinical signs and history of reduced milk yield along with high SCC were categorised as sub clinical mastitis, which accounted about 77.56 %. The earlier researchers from Odisha reported a similar higher prevalence of subclinical mastitis i.e. of 43.57 % (Sahoo and Parida, 2002). Lack of awareness about hygienic managerial practices among the farmers is considered for the high prevalence of subclinical mastitis in some localities as reported by Zeedan *et al.* (2014).

Age, Breed, Milk Yield

Age wise incidence of mastitis showed an increased occurrence of mastitis in older animals i.e. Mean \pm SE of 6.33 ± 0.12 years. The t-test analysis in this study regarding age showed that the incidence of mastitis is significantly increased with age. Qayyum *et al.* (2016) reported about increased prevalence of mastitis in older animals which to be related to increased susceptibility of pathogenic organisms in udder relaxed sphincter muscles of teats. Stress associated with production on a long term with age may weaken the immune status in combating the infection thus causing high incidence of mastitis in the older cows. The chi-Square analysis in the study results significant higher incidence of mastitis in CBJ (70.41 %), followed by HF (16.33 %) with least incidence seen in indigenous (deshi) / non- descript breed i.e.13.27 %. The present study showed a significant ($p < 0.05$) relation between milk yield and mastitis which observed an increased incidence in high yielders than low yielders. Out of 234 cows screened for mastitis, 98 cows were positive for mastitis with a milk yield of 9.8 ± 0.28 lts while other 136 control but apparently health cows resulted non-mastitis with a milk yield of 5.53 ± 0.26 lts. This finding corroborates with Sarba and Tola (2017) and Awale *et al.* (2012). This might be due to variation in their immune response against any infection as CBJ and HF are considered more yielders as well as with heavy body weight than deshi/ indigenous cows which may put stress related to production as well as having more body surface area with increased exposure to various environmental microbes. Increased incidence of mastitis in the heavy yielders might be due to more physiological stress and strain of high milk production with relatively longer time opening of teat sphincters.

Udder Type, Teat Wise Prevalence

Udder wise prevalence for mastitis showed highest incidence (48.98 %) in cup shaped udder, followed by bowl shaped udder (30.61 %) with least incidence in round shaped udder (20.41 %). Present study concluded a higher prevalence in hind quarter (57.14 %) than fore quarter (42.85 %). Similarly, teat wise prevalence with highest affection seen in right hind teat (40 %), followed by left fore (24 %), right fore

(19%) and least in left hind teat (17 %). In the present study, the distance from the ground to each teat measured by a measuring tape which showed about the shortest distance in right hind teat from the floor followed by left fore teat which indirectly linked with increasing occurrence of mastitis in these teats although the result showed a non-significant relationship. Tripura *et al.* (2014) also opined an increased prevalence of mastitis in hind quarters which might be due to increased milk production performance followed with relaxed teat sphincters and contaminated hind legs. Increased incidence of mastitis in hind quarters may be due to its higher chance of exposure by dung and urine (Guha *et al.*, 2012). Qayyum A *et al.* (2016) stated that due to the more udder depths and close to the ground in cup or pendulous udder, mastitis affections were more.

Floor Type of the Shed

The present study categorized the floors of the cow shed into three categories i.e. earthen, brick and concrete. The Chi-square analysis of intrinsic risk factors i.e. floor types revealed significantly ($p < 0.05$) higher prevalence of mastitis in earthen floors (48.98 %) followed by brick type (38.78 %) and least incidence in concrete floors (12.24 %). This finding is in contrary of Qayyum A *et al.* (2016) who observed an increased prevalence of mastitis in cattle which were kept on brick or cemented floor. More prevalence comparatively on the earthen followed by brick floors in present study might be due to improper cleaning as well as longer duration of dampness of the floors which acted as a good source of environmental bacteria in milk.

Herd Size and Season

The Chi-Square analysis regarding incidence of mastitis with herd size showed a significant ($p < 0.05$) association with highest incidence (58.16 %) among cows living in a herd size of > 5 , followed by 34.69% in the second group i.e. in a herd size of 2 – 5 cows and least (7.14 %) in the herd size of ≤ 2 cows. Sarba and Tola (2017) reported that there was also significantly ($p < 0.05$) higher (46.6 %) mastitis prevalence in larger herd than smaller herds (24.2%) and among the farming systems in semi-intensive (47.1 %) and intensive (42.3 %) than extensive (8.1 %) management system. Increased incidence in cows with more herd size may be related to various farm as well as animal level management factors which can influence husbandry practices. Now-a-days, peoples are keeping cows in more herd size only with an aim of making more profit by selling milk without taking due care about sanitation, hygiene and maintaining dirty and wet areas in the shed which favour the proliferation and transmission of mastitis causing organisms from one to another. Present study showed a non-significant association between season and incidence of mastitis among cows with highest incidence of mastitis found in rainy season (62.24 %) followed by summer season (26.53 %) and winter season (4.08 %). Kurjogi and Kaliwal (2014) reported about high incidence of mastitis

during monsoon season followed by winter and summer season which might be due to the unhygienic environment, more calving, high humidity, more exposure to animal excreta.

Stage of Lactation and Parity

The present study observed a significant increase in incidence of mastitis in the first month of lactation i.e. about 47.96 %, followed by last month of lactation i.e. 25.51 %, second month of lactation (15.31 %) and least incidence in the 3rd month of lactation (11.22 %) among the cows screened for mastitis. Fadlemula *et al.* (2009) reported the highest incidence (62.7 %) in the first month and the lowest (11.2 %) in the late stage of lactation. Sharma *et al.* (2011) reported that cows were more prone to oxidative stress with low antioxidant defences in early lactation leading to increase in the incidence of mastitis during that period. Similarly, higher incidence of mastitis was also reported during the first 2 months of lactation and first 2-3 weeks of dry period (Sharma *et al.*, 2012). Retention of placenta (ROP) bears a significant association with incidence of mastitis in cows in our present study which might be due to increased chance of infection at post-parturient stage. Significant association between parity and mastitis was found through Chi-Square analysis in this study with an increasing incidence at 5th parity (36.73%), followed by 4th parity (23.47%), 3rd parity (22.45%), 2nd parity (8.16%), 6th parity (4.08%) with lowest incidence in 8th parity (1.02 %). Rabbani *et al.* (2010) found that the prevalence of subclinical mastitis was highest at 4th (75.0 %) and 5th (75.0 %) parity in Holstein Friesian crossbred cows, and at 4th (75.0 %) parity in Red Chittagong cows in comparison to 1st and 2nd parity. However, an increasing tendency was recorded with increase in parity. Endale *et al.* (2016) opined the prevalence of subclinical mastitis which was found to be highest both at <2 parity (43.33 %) and > 5 parity (43.33 %) in comparison to 3rd and 4th parity. Moroni *et al.* (2006) opined that probability for intra-mammary infection tended to increase with increase in parity number up to fifth lactation.

Method of Milking and Teat Size

Increased incidence of mastitis (93.88 %) was seen in Manual / Hand milking practice while 6.12 % of mastitis was seen in machine milking practice. This study corroborates with the observations of Rakesh *et al.* (2004) who reported a higher prevalence of mastitis in hand-milked cows than machine-milked cows. This observation can be attributed to irregular and incomplete milking and maintenance of un-hygienic conditions in hand-milked animals. The present study concluded a non-significant association exists between teat sizes with the incidence of mastitis with high affections in disk shaped teats (35.71 %) than inverted teats (29.59 %) which is in contrary with the findings of Qayyum A *et al.* (2016) who observed an increased prevalence of mastitis in cattle with pointed teat.

Use of Teat Disinfectants and Habitat

The present study grouped the animal owners into three categories such as First group: Never use teat disinfectants prior or post milking, Second group: Sometimes the owners use teat disinfectants and third group: Always use teat / udder disinfectants. The Chi-Square analysis regarding incidence of mastitis showed a significantly ($p < 0.05$) more in first group i.e. 59.18 % followed by 38.78 % in the second group and least occurrence was found in third group i.e. only 2.04 %. Galton *et al.* (1982) opined cleanliness of the udder is thought to influence the quantity and type of bacteria present on teat surfaces. Use of disinfectants lowered the bacterial load in teat/ udder as well as in milker's hand results in decreasing the incidence of mastitis. Du Preez (2002) recommended that sanitary milking habits are important to avoid the spreading of bacteria or their proliferation. There is a significant association exists between the habitat of the cows with incidence of the disease in the present study i.e. 57.14 % in rural and 42.86 % of urban habitat. The lesser incidence among the urban areas might be due to more awareness, knowledge, better veterinary facility as well as quick approach to the animals in time of need in urban areas. There is more callousness, carelessness, lack of sanitation/hygiene and lack of veterinary care facilities in rural areas which results in more incidence of mastitis.

Conclusion

The present in-depth analysis of various risk factors associated with the incidence of mastitis concluded that there is a significant association of mastitis occurrence with high yielders, older and heavy body weight cows in semi organized farming system with capacity >5 cows generally. Mastitis affections highest in right hind teat with cup shaped udder. Non-descript deshi cows have lower incidence than Cross bred Jersey. Rainy season encounters maximum occurrence of mastitis. Incidences of subclinical mastitis are more than the clinical mastitis. Care should be done to conduct routine screening of high yielders in subclinical stage to avoid the future consequences. These epidemiological risk factors will definitely guide researchers, clinicians as well as farmers in guiding to combat or lowering incidences of this highly economic devastating disease through making proper awareness on hygienic managemental practices.

Conflict of Interest

The authors have no conflict of interest.

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