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Prevalence of subclinical mastitis in cattle in and around Bikaner district of Rajasthan

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Abstract

Lactating cows (n=100) were examined for subclinical mastitis (SCM) by California Mastitis Test (CMT) and cultural examination during the period from December, 2018 to December, 2019. On the basis of CMT; the prevalence of SCM was 42% and 24.50% on animal and quarter basis and on the basis of cultural examination; the prevalence was 51% and 29.75% on animal and quarter basis, respectively. Highest prevalence of SCM was observed in right hind quarter (45%) followed by left hind quarter (30%), right fore quarter (23%) and left fore quarter (21%). Maximum numbers of cows (72.22%) were affected with SCM in Vth parity, followed by 64.00, 63.63, 58.33, 31.57 and 13.33% in IVth, VIth, IIIrd, IInd and Ist parity, respectively.

Keywords: Subclinical mastitis, CMT, prevalence, parity

1. Introduction

Mastitis is a global problem in dairy animals that adversely affects animal health, quality of milk and economics of milk production leading to huge financial losses (Sharma *et al.*, 2004) [1]. Apart from economic importance, it also carries public health concerns due to drug residue in milk and transmission of pathogenic organisms to human population and subclinically affected animals remain a continuous source of infection to other herd mates too. The subclinical mastitis (SCM) is a more serious problem and responsible for much greater loss to the dairy industry (Kader *et al.*, 2002) [2]. Annual economic losses due to mastitis in India have been estimated to be Rs. 7165.51 crore that include Rs. 4151.16 and 3014.35 crore due to subclinical and clinical mastitis, respectively (Bansal and Gupta, 2009) [3]. Cases of subclinical mastitis are neither readily detectable by manual palpation of glands nor by visual examination of the milk. Because of the large numbers of subclinical cases, the diagnosis of mastitis depends largely on indirect tests that rely on the leukocyte content which increased significantly in the milk of affected glands and cultural examination of milk (Radostits *et al.*, 2009) [4]. Therefore, the present study was undertaken with the aim to detect the prevalence of SCM in lactating cattle in and around Bikaner.

2. Materials and Methods

2.1 Collection of milk samples

The study was conducted on 400 quarter milk samples of 100 apparently healthy lactating dairy cows from Livestock research station (LRS), Rathi farm, College of Veterinary and Animal Science, Bikaner and individual holding in and around the Bikaner city. Milk samples from all the four quarters of these animals were collected aseptically by washing the teats, drying and sterilized with cotton soaked in 70 per cent ethyl alcohol.

2.2 Analytical procedures

The procedures were followed for processing of milk samples are as follows:

2.2.1 California mastitis test

Mastitic milk samples showed a varying degree of precipitation and gel formation during stirring depending upon the severity of mastitis due to presence of leucocytes. Depending on the degree of precipitation and gel formation, readings of positive test were categorized as weak positive (+), distinct positive (++) and strong (+++) positive, respectively.

2.2.2 Cultural examination

With the help of a four mm diameter platinum loop 0.01 ml of the sample was streaked on five per cent sheep blood agar, Nutrient agar plate and Mannitol salt agar/Mac-Conkey agar plates in primary, secondary and tertiary fashion in order to obtain isolated colonies of bacteria. These petri dishes were incubated for 24 hours at 37 °C and in case colonies did not appear or were found small, the plates were incubated for further 24 hours. Following incubation, the plates were observed for colonial characteristics and haemolytic zones on blood agar plates. If more than one type of colonies appeared on the agar plates, the different colonies were fished out and subcultured separately for obtaining the pure culture of the bacterial isolates. Mannitol salt agar culture plates were observed for appearance of *Staphylococci* and *Micrococci* colonies as it is selective media for Gram positive bacteria *Staphylococci* and *Micrococci*, as high level of NaCl is inhibitory to most other bacteria. In Mannitol salt agar *Staphylococcus aureus* (Mannitol fermenting) produced yellow colonies with yellow zones, whereas other coagulase-negative *Staphylococci* eg. *S. epidermidis* (Non mannitol fermenting) produce small pink or red colonies with no colour change to the medium. Mac-Conkey agar culture media plates were also observed for the appearance of colonies. The colonies were further examined for fermentation reaction of lactose. The lactose fermenting colonies were distinguished by their red or pink colour and non-lactose fermenting colonies were colourless. Now, pure lactose fermenting culture were streaked on Eosine Methylene Blue (EMB) agar plates and incubated for 24 hours. The cultures that gave metallic sheen were considered as having *E. coli*. This appearance of metallic sheen on culture was due to the formation of eosinate from eosine. Quarter wise and parity wise prevalence of SCM was recorded.

Table 1: Result of CMT and cultural examination in 400 quarter milk samples from 100 apparently healthy cows

Animals culturally positive/ Total animal	Quarters culturally positive/ Total quarters	CMT positive animals / Total animals	CMT positive quarters / Total quarters
51/100 (51.00%)	119/400 (29.75%)	42/100 (42.00%)	98/400 (24.50%)

Figures in parentheses indicate percentages

Such variations in prevalence might be ascribed to the varied management and hygienic practices adopted in different dairy herds (Pankaj *et al.*, 2013)^[22]. Besides farm practices, certain factors such as milk yield, stage of lactation, udder morphology, immune status of animals, method of diagnosis and agro-climatic conditions of different regions also seem to affect the prevalence of mastitis (Raza *et al.*, 2011)^[23].

3.1 Quarter-wise Prevalence

In this study more number of cattle showed involvement of right hind quarters (45 per cent) and then left hind quarter 30 per cent whereas right fore and left fore were affected in 23 per cent and 21 per cent of quarters, respectively (Table 2).

Table 2: Quarter-wise Prevalence of subclinical mastitis in cattle

Quarters affected	No. of quarters screened	No. of quarters affected	Percentage
Right Hind	100	45	45.00
Right Fore	100	23	23.00
Left Hind	100	30	30.00
Left Fore	100	21	21.00

3. Results and Discussion

On the basis of California mastitis test, the prevalence of subclinical mastitis was 42 per cent (42/100) and 24.50 per cent (98/400) on animal and quarter basis (Table 1). Present study was similar to the study of Chahar (2001)^[5], Ayano *et al.* (2013)^[6] and Choudhary (2018)^[7] wherein they reported animal wise prevalence was 51.28 per cent, 41.02 per cent and 44 per cent, respectively. Present study was also in close approximation to the study of Islam *et al.* (2011)^[8], Constable *et al.* (2017)^[9], Marwaha (2018) and Kachhawa (2018)^[11] who reported prevalence of 29.50 per cent, 10-25 per cent, 19.50 per cent and 27.31 per cent on quarter basis.

On the basis of cultural examination, the prevalence of subclinical mastitis was 51 per cent (51/100) and 29.75 per cent (119/400) on animal and quarter basis (Table 1). Almost similar cow wise prevalence on the basis of cultural examination has been reported by Giannechini *et al.* (2002)^[12], Supriya and Lather (2010)^[13], Shrestha and Bindari (2012)^[14], Siddiquee *et al.* (2013)^[15] and Marwaha (2018)^[10] reported 52.4 per cent, 53.33 per cent, 52.00 per cent, 55.1 per cent and 52 per cent, respectively. Present study was also in close approximation to the study of Abdul (2009)^[16] and Choudhary (2018)^[7] who reported prevalence of 30.73 per cent and 28 per cent on quarter basis.

However, the infection rate observed in the study was higher in comparison to the findings of Kushwaha (2016)^[17] and Sztachanska *et al.* (2016)^[18] who reported prevalence of subclinical mastitis in cows as 16.29 per cent and 36.7 per cent but lower than Sharma *et al.* (2010)^[19], Varatanovic *et al.* (2010)^[20] and Singh (2015)^[21] who reported that the prevalence of subclinical mastitis was 67.76 per cent, 63.3 per cent and 66 per cent on cow basis.

The findings were similar to the Singh *et al.* (2010)^[24] who observed higher incidence of subclinical mastitis in hind quarters (67.92%) when compared to for quarters (32.56%) which could be attributed to greater exposure of the hind quarters to contamination with dung and urine. Bhattacharya (2002)^[25] found the prevalence of mastitis on quarter basis was 16.85, 21.34, 28.08 and 33.70 per cent in right fore, left fore, right hind and left hind quarters, respectively. Akhtar *et al.* (2012)^[26] analyzed the data on subclinical mastitis according to quarter disposition and stated that the reasons for more involvement of hind quarters might be due to more frequent exposure to dung and urine, large capacity and mass, greater vulnerability to direct trauma and relatively more closeness to the floor when compared to for quarters.

3.2 Parity-wise Prevalence

Highest prevalence was observed in Vth parity on cow basis. On cow basis the highest prevalence was 72.22 per cent in Vth parity, followed by 64.00, 63.63, 58.33, 31.57 and 13.33 per cent in IVth, VIth, IIIrd, IInd and Ist parity, respectively. It was observed that the prevalence of subclinical mastitis increased with parity and attained peak in 3rd to 6th parity. This could be due to lowered resistance of the animals as lactation number increased and improper functioning of the teat sphincter as mentioned by Singh and Baxi (1982)^[27].

Table 3: Parity wise Prevalence of subclinical mastitis in cattle

Parity	No. of cows examined	No. of cows positive for subclinical mastitis	Percentage
I	15	2	13.33
II	19	6	31.57
III	12	7	58.33
IV	25	16	64.00
V	18	13	72.22
VI	11	7	63.63

The finding was similar with Sudhan *et al.* (2005) [28], Morni *et al.* (2006) [29], Singh (2015) [21] and Kushwaha (2016) [17] who observed highest prevalence in IVth parity and Vth parity. Nibret *et al.* (2012) [30] found that the 1st to 3rd lactation had significantly lower prevalence of subclinical mastitis than those with higher parity and Saini *et al.* (1994) [31] reported that the incidence of subclinical mastitis was the lowest during first parity, which increased with subsequent parities and it was highest in seventh parity. Higher incidence of subclinical mastitis during late lactation might be due to lowered resistance of animals and weakening of teat sphincter.

Conclusion

In the present study the prevalence of subclinical mastitis by CMT and cultural examination was 42 and 51.00 per cent on cow basis and 24.50 and 29.75 per cent on quarter basis. The highest prevalence was found in Vth parity and the right hind (RH) quarter was most commonly affected followed by left hind (LH), right fore (RF) and left fore (LF) quarters.

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