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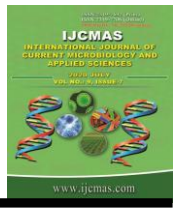

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Prevalence and detection of Subclinical Mastitis by California Mastitis Test (CMT) in Dairy Farms of Theni District in Tamil Nadu, India

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A B S T R A C T

The present investigation was carried out during the front line demonstration programme conducted at ten villages in Theni District of Tamil Nadu. A total 120 milk samples from 30 cows were screened by Modified California Mastitis Test for identification of subclinical mastitis. Out of 120 milk samples, about 24 milk samples were positive for subclinical mastitis while 96 milk samples observed to normal. Totally 120 samples were screened 13 samples as1+,8 samples as 2++ and 3 samples as 3+++ out of 24 subclinical mastitis affected milk samples. On the basis of stage of lactation wise early, mid and late stage of lactation, the prevalence of subclinical mastitis was 28.57%;16.67% and 16.67% respectively. The quarter wise, right forequarter, right hindquarter, left forequarter and left hindquarter, the prevalence of subclinical mastitis was 16.66%;54.17%;8.33% and 20.83% respectively. On the basis of parity, from first to fourth parity, the prevalence of subclinical mastitis was 9.09%;16.66%;25.00% and 25.00% respectively. CMT is a reliable diagnostic method in field conditions.

Introduction

Mastitis is defined as inflammation of mammary gland. It is divided into two types: clinical and subclinical. Clinical mastitis is easy to detect (seeing clotted milk or changes in milk). But Subclinicalmastitis is asymptomatic; therefore, produced milk appears to be normal. It is now a well-known fact that the subclinical mastitis is more serious and is responsible for much greater loss to the dairy industry (Miller *et al.,* 1993). Subclinical mastitis can only be demonstrated using various tests such as California Mastitis Test (CMT), Whiteside test (WST), Surf field mastitis test (SFMT), Sodium Lauryl Sulphate test (SLST), Microscopic Somatic Cell Count (MSCC) (Sharma *et al.,* 2010 and Hoque *et al.,* 2014) and Electrical Conductivity (EC) (Hegde *et al.,* 2013).

Enzymatic analyses such as colourimetric and fluorometric assays have also been developed (Viguier *et al.,* 2009).

New advanced techniques such proteomics have been recently developed and used in detection of proteins involved in mastitis (Lippolis and Reinhardt, 2005;Van Leeuwen *et al.,* 2005 and Smolenski *et al.,* 2007). Most of these tests are preferred as screening tests indicating SCM since they are easy to use and yield rapid as well as satisfactory results. However, CMT has been recognized as a reliable, highly sensitive, inexpensive rapid screening test in field conditions even by less trained dairy men based upon the amount of cellular nuclear protein present in the milk sample (Joshi and Gokhale,2006 and Madut,2009).The present study was to investigate the prevalence of subclinical mastitis in dairy cows of Theni district by using field test i.e. California Mastitis Test.

Materials and Methods

The present investigation was carried out during the front line demonstration programme conducted at ten villages in Theni District of Tamil Nadu during the period from 2018 to 2019**.**Totally 30 crossbred dairy cows (Jersey / HF) of different age groups (3-6 years), different parities (1-4) and different stage of lactation (Early, mid and Late) were included in the investigation study group. All cows were stall fed and milked twice daily by hand milking. The regular practices of washing of udder before milking with clean water were used by milking man.

California mastitis test and detection of scm

Prior to milk collection for mastitis screening, clinical examination was performed on the every lactating cow. Thorough palpation of the udder to detect any fibrosis, swelling, and other clinical signs was performed. Watery milk, milk with pus or clots, and blind quarters were also examined. Identification of at least one of these signs was enough to consider the mammary quarter as positive to CM and was excluded from the study .Subclinical mastitis prevalence was obtained by the use of California Mastitis Test (CMT) which was conducted using scores from 0 to 4 from the modified Scandinavian scoring system, where 0 is negative result (no gel formation), 1 istraceable (possible infection), and 2 or 3 indicates a positive result and 4 has the thickest gel formation. Milk samples were collected from all four quarters and individually analysed with CMT to detect SCM, as previously described (Quinn *et al.*, 2011).After confirming SCM by CMT, the udder and teats were cleaned with water and wiped using sterile towels. The teat orifice and the skin around the teat were dipped with KMnO4 and dried off with sterile towels.

2ml of milk from each quarter was taken into the respective four cups of CMT paddle. An equal amount of above CMT reagent was added in each cup and gently mixed and rotated anticlockwise for few seconds and result was recorded within 30 seconds as 0 (negative),T(trace(,1+,2++ or 3+++ as per manufacture instructions..

Results and Discussion

In the present investigation, a total 120 milk samples from 30 cows were screened by modified California mastitis test for identification of subclinical mastitis. Out of 120 milk samples, about 24 milk samples were positive for subclinical mastitis while 96 samples observed to normal. The positive samples were graded into three grades as per their grading i.e.1+ traceable(possible infection),2++(distinct positive) and 3+++(strong positive).Totally 120 samples were screened 13 samples as1+,8 samples as 2++ and 3 samples as 3+++ out of 24 subclinical mastitis affected milk samples. The overall animal and breed like Jersey and HF wise, the prevalence of subclinical

mastitis was 30.00%;10.00% and 25.00% respectively. On the basis of stage of lactation wise early, mid and late stage of lactation, the prevalence of subclinical mastitis was 28.57%; 16.67% and 16.67% respectively. The quarter wise, right forequarter, right hindquarter, left forequarter and left hindquarter, the prevalence of subclinical mastitis was16.66%;54.17%;8.33% and 20.83% respectively. On the basis of parity, from first to fourth parity, the prevalence of subclinical mastitis was 9.09%; 16.66%;25.00% and 25.00% respectively

The result regarding animal wise prevalence of present investigation was close to in agreement with Lahamge *et al.,* (2019) who reported that the prevalence of subclinical mastitis in dairy cows was 33.30%. But slightly lower than report of Swami *et al.,* (2017). He found that the prevalence of subclinical mastitis in dairy cows was 35%.Varatanovic *et al.,* (2015) and Bonde *et al.,* (2014) reported that 60.00% and 56.02% the prevalence of subclinical mastitis in dairy cows respectively which was higher that of result of present investigation.

The result of present investigation the prevalence of subclinical mastitis regarding grade wise in dairy cows was close to in agreement with Kasikei *et al.,* (2012) evaluated total 386 milk samples from quarters of 188 cows out of that 258(66.85%),85(22.02%)and 43(11.13%) milk samples as CMT(+), CMT(++), CMT (+++) respectively. But lower than result of Risvanli and Kalkan (2002) whose reported out of 271 subclinical mastitis quarter 8.12%, 22.88% and 69.00% of quarter positive for CMT (+), CMT(++),CMT(+++) respectively. The result of present investigation the right hindquarter was more susceptible than other quarters. Cows with third and fourth parity and early stage of lactation were more susceptible subclinical mastitis than others. Which was close to in agreement with Sudhan *et al.,* (2005) and Badiuzzaman *et al.,* (2015) reported that the right hindquarter was more significantly ($p<0.001$) susceptible to subclinical mastitis than other quarters. Cows with third and fourth parity and at their early stage of lactation had significantly higher in prevalence of subclinical mastitis. This observation supports with the reports of Joyoti *et al.,* (1998) who reported 77.77%, 63.76% and 41.00% prevalence of subclinical mastitis in early, mid and late stage of lactation respectively. Rahman *et al.,* (1997) reported that highest prevalence of subclinical mastitis during the third months (34.00%) lactation. Lalrintluanga *et al.,* (2003) reported that mastitis incidence was higher during the early stage of the third lactation(36.60%).

However, somatic cell count is found out to increase in first few days of lactation and may be high up to the first month of lactation (Atakan,2008) and increase towards the end of lactation is considered to be physiological. Sederevicius *et al.,* (2006) reported a temporary increase in somatic cell count just after calving due to adaptation of the udder from non-lactating to lactating status, while in mid lactation somatic cell count usually remains in normal range.

The CMT test showed higher prevalence rate of subclinical mastitis than other test. For identification of subclinical mastitis CMT test was considered as good test and most accurate test diagnostic technique (Schalm *et al.,* 1971). The variation of prevalence might be attributed to various factors i.e. age, breed, lactation period, season etc. Kurjogi and Kaliwal (2014) also has reported that age, lactation period of the cow and environmental factors could be directly associated with the subclinical mastitis, whereas, clinical mastitis is more associated with the breed of the cow and environmental conditions.

Table.1 Prevalence of subclinical mastitis

Particulars	Numbers	Positive	Negative	Percentage
No. of Animals	30	6	24	30.00
CMT Test	120 milk samples	24	96	30.00
CMT Grade	24	13 samples 1+ (54.16%)	8 samples 2++ (33.33%)	3 samples 3+++ (12.50%)
Jersey	10	1	9	10.00
HF	20	5	17	25.00
Early lactation	14	4	10	28.57
Mid lactation	6	1	5	16.67
Late lactation	4	1	3	16.67
Right forequarter	24	4	20	16.66
Right hindquarter	24	13	11	54.17
Left forequarter	24	2	22	8.33
Left hindquarter	24	5	19	20.83
First parity	11	1	10	9.09
Second parity	6	1	5	16.66
Third parity	8	2	6	25.00
Fourth parity	5	2	3	25.00

Similarly, Ranjan *et al.,* (2011) also has reported change in occurrence of bovine mastitis under different climatic conditions. The results of this current study concur with other recent trials that the CMT has the potential to be a rapid, accurate, and economically feasible test for fresh cows. There remains a definite need for cow-side test procedures that could be used on CMT positive quarters to identify specific pathogens.

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