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Prevalence of subclinical mastitis in dairy cattle in Devanahalli taluk

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Abstract

The current study was undertaken to find out the presence of SCM in pooled samples collected from dairy cattle and to track the SCM cases in individual herds of selected villages in Devanahalli taluk of Bengaluru rural district. Out of 1330 pooled milk samples screened for SCM, 101 household samples were positive for SCM by CMT with overall prevalence of 7.59 percent. Later the positive cases were tracked to individual household and all the animals were screened for SCM by CMT. Out of 413 animals screened for SCM, 127 (30.75%) animals were found positive. All the 127 samples were subjected to Electrical conductivity and Somatic cell count for confirmation.

Keywords: CMT, SCM, SCC, Electrical conductivity

Introduction

India has emerged as the largest producer of milk (176.3 MT) with 20.17 percent share in total milk production in the world with an annual growth rate of 6.62 percent. In the recent times, dairy farming is changing to dairy industry with lot of entrepreneurs are taking up dairying over farming by setting up well organised farms.

Mastitis is inflammation of mammary gland affecting all species of domestic animals and is of great concern to dairy industry. Mastitis is very common in cattle of both developed and developing countries and is an economically important disease affecting dairy cattle breeding as it occurs very frequently and reduces milk production.

Mastitis is mainly classified into clinical and subclinical mastitis (Kader *et al.*, 2003)^[7]. About 75-80 percent mastitis is subclinical, characterized by a significantly increased leukocyte count in milk (Bradley 2002)^[3]. In subclinical mastitis (SCM), there are no obvious clinical signs such as abnormal milk, udder swelling or tenderness, or systemic signs such as fever, depression. Instead there is an increase in somatic cell counts of the milk (Radostits *et al.*, 2007)^[14].

Subclinical Mastitis (SCM) is important due to the fact that it is 15 to 40 times more prevalent than the clinical form, is of long duration, difficult to detect, adversely affects milk quality and production of dairy animals and constitutes a reservoir of microorganisms that can affect other animals within the herd due to its contagious nature (Schultz *et al.*, 1978)^[16].

In the present study the vast population of dairy cattle were covered by subjecting the pooled milk samples for CMT at milk producer's co-operative societies from herds of dairy cattle and tracking back the positive samples into individual households/herds to check each and every animal in the herd, further the animals which were positive for SCM through CMT were considered for the present study.

Materials and Methods

- CMT reagent (M/s Ruchi pesto chem (India) Pvt. Ltd. Pune)
- Milk checker (Eisai Co. Ltd. and Orient Instruments Ltd., Tokyo, Japan).
- Stage micrometer (ruled in 0.1 and 0.01mm).
- Micropipette 10 -100 µL.
- Micro tips 10 µL.
- Standard microscope
- Modified Newman – Lampert's stain (Schalm *et al.*, 1971)^[17].

1330 pooled household milk samples were tested for SCM by CMT. Positive samples were tracked to household and 127 samples are collected from individual animals. Milk samples were collected at evening milking. The first three streams of foremilk were discarded. The teats were then carefully cleaned using cotton and 70 percent ethanol. About 15 mL of milk was collected aseptically in sterile vials. Samples were immediately transported to laboratory under refrigeration condition.

Milk samples were screened using California Mastitis test according to the procedure given by Quinn *et al.* (1999)^[13].

About 20 mL of milk was drawn into the milk receptacle of milk checker and switch was pressed to know the conductivity. The instrument calibration was checked against 0.05 M potassium chloride solution. The electrical conductivity value of more than 6.5 mS/cm was taken as positive index of subclinical mastitis. (Swarup *et al.*, 1989).

Somatic cell count was performed as per the procedure according to general principle of Prescott and Breed method as detailed by Schalm *et al.* (1971)^[17].

Results and discussion

This study was aimed at diagnosis of subclinical mastitis of individual animals tracked from milk Producers's cooperative societies (MPCS). The pooled samples were screened at MPCS by CMT.

A total of 1330 pooled household milk samples were screened for subclinical mastitis by employing California mastitis test at MPCS of 17 villages of Devanahalli taluk of Bangalore rural district, Karnataka state.

Out of 1330 pooled household milk samples screened for SCM, 101 animals were positive for SCM by CMT with overall prevalence of 7.59 percent.

Among 17 selected villages of Devanahalli taluk, Kodagurki (13.72%) had the highest prevalence for SCM followed by Hosudya (10.81%), Gaddadanayakanahalli (10.34%), Binnamangala (8.33%), Nallapanahalli (9.37%), Hurulugurki (9.19%), Jaalige (8.97%), Somathanahalli (8.40%), Yeliyuru (7.08%), Cheemachanahalli (7.69%), Neeleri (7.46%), Aavathi (7.40%), Bhatramarenahalli (7.24%), Meesaganahalli (6.09%), Karahalli (5.43%), and Mudugurki (3.27%). Chikkanahalli had the lowest incidence of 3.03 percent.

In this study, 101 (7.59%) were positive for SCM. However, Prophan *et al.* (1996) reported a slightly higher prevalence of 15.8 percent of SCM in cows.

Prevalence of SCM in cows reported by other researchers include 28.50 percent by Kayesh *et al.* (2014)^[9], 28.6 percent by Khanal and Pandit (2013)^[11], 29.5 percent by Islam *et al.* (2011)^[6], 32.90 percent by Sharma and Sindhu (2007)^[18], 36 percent by Khan and Muhammad (2005)^[10] and Bachaya *et al.* (2011)^[1], 43.4 percent by Santhoran *et al.* (2016)^[15].

In the present study the prevalence of SCM was lowest compared to most of the previous studies. This was a unique attempt to study the prevalence of SCM on herd basis. The low prevalence of SCM in the present study may be due to testing of pooled samples which has a very scientific milk production and supply chain.

In the present taluk where study was conducted, the milk union doctors regularly check the pooled milk samples for SCM and the owners of positive herds are advised to treat the animals with trisodium citrate. Hence the prevalence may be low in these herds. Further, occurrence of SCM is related to managemental practices followed in the herd. Results may also vary based on the tests used. Further in the present study, pooled milk samples were tested to know the positive herds for SCM so that individual animals can be tracked.

High prevalence of 62 percent SCM by electrical conductivity was reported by Hegde *et al.* (2013)^[4] by electrical conductivity. Hoque *et al.* (2014)^[5] reported a higher prevalence of 71.9 percent SCM by SCC.

However, inspite of regular monitoring and follow up by milk union doctors, prevalence of 7.59 percent SCM in the herds is quite alarming and needs further stringent monitoring and surveillance of SCM and improving the management practices.

All the 127 samples positive for SCM by CMT were further subjected to SCC and EC. All the samples had SCC of $\geq 5 \times 10^5$ cells/mL which indicated that all were positive for SCM. Further by EC test, 112 (88.18%) out of 127 samples had ≥ 6.5 mS/cm which were considered positive. However, this indicated that CMT and SCC are more sensitive tests as compared to electrical conductivity in diagnosing SCM.

In the present study 127 individual milk samples which were positive for SCM by CMT were graded as +, ++ and +++. The number of samples with + were 29 (22.83%), ++ in 65 (51.18%) and +++ in 33 (25.98%) samples.

In contrast, Kamal *et al.* (2014), observed CMT +++ in more number of samples (44.4%) as compared to the present study. However, Badiuzzaman *et al.* (2015)^[2] reported CMT + in 55.09% of cases which was much higher than other grades.

Grading of CMT is helpful to know the severity of subclinical mastitis, especially it is comparable to SCC. Usually increased CMT grades have higher SCC. Based on the results obtained in this study it is safe to conclude that CMT results can give indication to the severity of SCM as different grades of CMT exhibited a direct relation with SCC.

Out of 127 CMT positive samples, 112 (88.18%) samples were positive by electrical conductivity (EC) considering ≥ 6.5 mS/Cm as the cut-off. EC is the conventional method used for detection of SCM. Handheld EC meters give results within 10 SECS. However the present study EC test was found to be not sensitive as CMT and SCC.

Hegde *et al.* (2013)^[4] found that among 246 samples 92 (38%) were negative and 150 (62%) were positive for SCM by EC, considering ≥ 6.5 mS/Cm as the cut-off value.

In this study all the 127 samples which were positive by CMT were also positive for SCM by SCC having counts ≥ 5 lakh cells/mL. These samples were grouped into 3 groups *viz.* 10–20 $\times 10^5$ cells/mL, 20–40 $\times 10^5$ cells/mL and $\geq 40 \times 10^5$ cells/mL.

SCC has been used for diagnosis of SCM by various workers (Kumar, 2009; Sulthana, 2014 and Hoque *et al.* 2014)^[12, 19, 5]. SCC is a standard test for detection of SCM. Hence, all the CMT positive samples had SCC $\geq 5 \times 10^5$ cells/mL indicating that the results of CMT and SCC correlate with each other.

Table 1: Number of pooled milk samples positive for SCM by CMT in different villages of Devanahalli taluk, Bengaluru rural district (n=101)

Sl. No.	Village	No. of pooled samples screened	No. of pooled samples positive	Percent positive
1	Yeliyuru	240	17	7.08
2	Gaddadanayakanahalli	58	6	10.34
3	Kodagurki	51	7	13.72
4	Somathanahalli	119	10	8.4
5	Cheemachanahalli	65	5	7.69
6	Nallappanahalli	32	3	9.37
7	Neeleri	67	5	7.46
8	Jaalige	78	7	8.97
9	Chikkanahalli	66	2	3.03
10	Meesaganahalli	82	5	6.09
11	Karahalli	92	5	5.43
12	Aavathi	54	4	7.4
13	Binnamangala	72	6	8.33
14	Hurulugurki	87	8	9.19
15	Hosudya	37	4	10.81
16	Mudugurki	61	2	3.27
17	Bhatramarenahalli	69	5	7.24
	Total	1330	101	7.59

Table 2: Number of individual milk samples positive for SCM by CMT in different villages of Devanahalli taluk (n=127)

Sl. No.	Village	No. of animals screened	No. of positive samples	Percent positive
1	Yeliyuru	53	20	37.73
2	Gaddadanayakanahalli	19	7	36.84
3	Kodagurki	34	10	29.41
4	Somathanahalli	35	12	34.28
5	Cheemachanahalli	25	7	28
6	Nallappanahalli	7	3	42.85
7	Neeleri	23	7	30.43
8	Jaalige	28	8	28.57
9	Chikkanahalli	5	2	40
10	Meesaganahalli	21	6	28.57
11	Karahalli	22	6	27.27
12	Aavathi	23	7	30.43
13	Binnamangala	27	8	29.62
14	Hurulugurki	36	9	25
15	Hosudya	23	5	21.73
16	Mudugurki	7	3	42.85
17	Bhatramarenahalli	25	7	28
	Total	413	127	30.75%

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