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Anusha Dasohari
Veterinary Asst. Surgeon,
Kammarpalli, Nizamabad Dist,
Telangana State, India

Ayodhya Somasani
Associate Professor and Head,
Dept. of Veterinary Medicine,
CVSc, Korutla, Telangana, India

Nagaraj P
Associate Professor, Veterinary
Hospital, Bhoiguda, Hyderabad,
Telangana, India

Gopala Reddy A
Professor and University Head,
Dept. of Pharmacology and
Toxicology, India

Correspondence
Anusha Dasohari
Veterinary Asst. Surgeon,
Kammarpalli, Nizamabad Dist,
Telangana State, India

Epidemiological studies of subclinical mastitis in cows in and around Hyderabad

Anusha Dasohari, Ayodhya Somasani, Nagaraj P and Gopala Reddy A

Abstract

The present study epidemiological studies of subclinical mastitis in cows “in and around Hyderabad” was undertaken to study the incidence of subclinical mastitis in cows, was carried out during a period of 7 months *i.e.*, February to August, 2015. To find out the incidence of subclinical mastitis (SCM), a total of 534 quarter milk samples from 136 apparently healthy cows of three local dairy farms and individual holdings were subjected to California Mastitis test (CMT), White Side Test (WST) and Surf Field Mastitis Test (SFMT). According to CMT, WST and SFMT, the quarter wise incidence was 35.02%, 32.96% and 30.52%, respectively, and animal wise incidence was 66.18%, 59.56% and 55.15%, respectively

Keywords: epidemiological study, subclinical mastitis, incidence

1. Introduction

Subclinical mastitis is bereft of any obvious manifestation of inflammation and is characterized by having no visible signs either in the udder or in the milk, but the milk production decreases and there is change in milk composition [6]. Subclinical mastitis is 3–40 times more common than clinical mastitis and causes the greatest overall losses in most dairy herds [2]. The incidence of subclinical mastitis in cows increases with increased milk production, unhygienic management practices and with increasing number of lactation [19]. Besides causing huge losses to milk production, the sub clinically affected animals remain a continuous source of infection to other herd mates [10]. The subclinical form of mastitis in dairy cows is important because it is 15 to 40 times more prevalent than the clinical form and is difficult to detect, reduces milk production and adversely affects milk quality. [28]

The present study was undertaken with the object of Subclinical Mastitis in Cows “in and around Hyderabad” was undertaken to study the incidence of subclinical mastitis in cows.

2. Materials and Methods

The study was carried out To find out the incidence of subclinical mastitis (SCM), a total of 534 quarter milk samples from 136 apparently healthy cows of three local dairy farms and individual holdings during the period from February 2015 to August 2015 and samples were subjected to California Mastitis test (CMT), White Side Test (WST) and Surf Field Mastitis Test (SFMT). The cows in lactation below three months after calving were taken as in their early lactation, those in between three to six months were taken as in their mid-lactation and above six months were taken as in their late lactation. The cows in very early (<15 days post calving) and very late lactation were excluded from the study due to false positive results. The data pertaining to age, breed, lactation number, stage of lactation, method of milking was collected. The affected animals were randomly selected into two uniform groups *i.e.*, group II and group III, each containing 10 animals. A group of ten healthy animals (group I) was also examined and the milk samples were taken for detailed analysis.

All the crossbred cows which have calved more than 15 days were taken for the investigation. The milk samples from different quarters were subjected to California mastitis test (CMT), White side test (WST) and Surf field mastitis test (SFMT) to diagnose subclinical mastitis. The data obtained was compiled and statistically analysed using paired-T test and student T test as per Snedecor and Cochran (1994). The values were represented as Mean \pm Standard Error.

3. Results and Discussion

In SCM, irrespective of the etiological agents involved, the first pathological change noticed is

is the migration of leucocytes into milk as a result of increased permeability of udder capillaries to inflammatory reaction. The intensity of inflammation can be estimated qualitatively by CMT, WST and SFMT and quantitatively by SCC. To find out the incidence of subclinical mastitis (SCM), a total of 534 quarter milk samples from 136 apparently healthy cows of three local dairy farms and individual holdings were subjected to California Mastitis test (CMT), White Side Test (WST) and Surf Field Mastitis Test (SFMT). In the present study an overall animal wise incidence of SCM by CMT was recorded as 66.18%. These findings are in agreement with researchers [16, 36, 8, 33, 4] who recorded an overall incidence of 70.37%, 56.1%, 64.9%, 54% and 67.27%, respectively. The quarter wise incidence of SCM in the present study by CMT was 35.02%. The present findings are in accordance with Barua *et al.* [3] and Biswadeep *et al.* [4] who reported an incidence of 32.43% and 39.55%, respectively. Animal wise incidence of SCM in the present

study by WST was 59.56%. Similar findings were presented by Rahman *et al.* [24], Biswadeep *et al.* [4, 8] who reported animal wise incidence of 51.3%, 64.55% and 60.5%, respectively. Studies of Rauf *et al.* [26] showed 45.16% incidence with WST.

In the present study the quarter wise incidence by WST was 32.96%. This is in agreement with Hawari and Al-Dabbas [7], Barua *et al.* [3] and Biswadeep *et al.* [4] who reported quarter wise incidence of 31.4%, 33.56% and 38.86%, respectively. Almost similar incidence (28.69%) was reported by Tijare *et al.* [37], with WST. Animal wise incidence was 55.15% according to SFMT. These findings are in accordance with Hoque *et al.* [8] and Shahid *et al.* [29] who reported an incidence of 57.9% and 53%, respectively. The quarter wise incidence was 30.52% by SFMT in the current study. Similar findings were reported by Muhammad and Khan [17], Barua *et al.* [3] and Bachaya *et al.* [2] who reported an incidence of 36%, 31.53% and 35.25%, respectively (table 1).

Table 1: Incidence of subclinical mastitis detected by various diagnostic procedures

S. No.	Diagnostic Test	Animal wise			Quarter wise		
		No. Tested	No. Positive	Incidence (%)	No. Tested	No. Positive	Incidence (%)
1.	CMT*	136	90	66.18	534	187	35.02
2.	WST**	136	81	59.56	534	176	32.96
3.	SFMT***	136	75	55.15	534	163	30.52

*CMT- California Mastitis Test, **WST -White Side Test,***SFMT -Surf Field Mastitis Test

According to CMT, age wise incidence was highest in the age group of 5-7 years (67.50%), followed by animals which were above 7 years (65.38%) and least in the animals aged between 3- 5 years (63.33%) (table 2). These results are in agreement with the findings of Dar *et al.* [5] who reported a highest incidence of 71.53% in the age group of 5-7 years, followed by 16.15% in the age group of 7 years and above and least in the cows aged between 2-4 years (12.3%). Whereas, with WST and SFMT highest incidence was observed in animals

above 7 years (65.38% and 57.69%), followed by 5-7 years (58.75% and 55%), and least in the age group of 3-5 years (56.67% and 53.33%), respectively. These findings are in accordance with Kurjogi and Kaliwal [14] who reported highest prevalence of 56% and 48%, respectively, for SFMT and WST in the cows aged 7-10 years and least in the age group of 3-6 years (27.66 and 20.21 per cent), respectively, for SFMT and WST.

Table 2: Incidence of subclinical mastitis in relation to age by various diagnostic procedures

S. No.	Age	Number of cows						
		Tested	CMT		WST		SFMT	
			Positive	Incidence (%)	Positive	Incidence (%)	Positive	Incidence (%)
1.	3-5 years	30	19	63.33	17	56.67	16	53.33
2.	5-7 years	80	54	67.50	47	58.75	44	55.00
3.	> 7 years	26	17	65.38	17	65.38	15	57.69
	Total	136	90	66.18	81	59.56	75	55.15

In the present study, incidence of SCM according to CMT, WST and SFMT in cross breeds was 76.6%, 69.15% and 63.83% and in native breeds was 42.86%, 38.10% and 35.71%, respectively (table 3). Irrespective of the diagnostic tests employed, the incidence of SCM was more in the cross

bred cows compared to the native breeds. Similar findings were observed by Kayesh *et al.* [12], Islam *et al.* [10] and Abdel-Rady and Sayed [1] who reported 45.28%, 36.36% and 20.43%, in cross breeds and 22.45%, 24.61% and 16.67% in native breeds, respectively.

Table 3: Incidence of subclinical mastitis in relation to breed by various diagnostic procedures

S. No	Breed	Number of cows						
		Tested	CMT		WST		SFMT	
			Positive	Incidence (%)	Positive	Incidence (%)	Positive	Incidence (%)
1.	Cross breeds	94	72	76.60	65	69.15	60	63.83
2.	Native breeds	42	18	42.86	16	38.10	15	35.71
	Total	136	90	66.18	81	59.56	75	55.15

The animal wise incidence according to CMT, WST and SFMT was highest in the fourth lactation (67.39%, 63.04% and 58.70%) and least in the second lactation (64%) according to CMT and first lactation (52.94% and 47.06%)

according to WST and SFMT, respectively. The analysis of data on the incidence of subclinical mastitis using CMT in relation to lactation number revealed highest incidence in the fourth and above lactations (67.39%), followed third

(66.67%), first (64.71%) and second lactations (64%) (table 4). Similar findings were reported by Ratna [25], who recorded highest prevalence in the fourth lactation (60.98%). Sharma *et al.* [30] reported highest prevalence in sixth and above lactations (37.03%) and least in the second lactation (7.4%). Kayesh *et al.* [12] recorded the highest (42.86%) in 7th parity. Nath and Dutta [18] reported higher incidence of SCM in the 3rd followed by 4th and 2nd lactation. Radostits *et al.* [23] emphasized that generally the incidence peaks at 7 years of age. Reports of Stripad *et al.* [35] indicate that the prevalence of SCM was lowest in first lactation (19.72%) and increased with the increase in the number of lactation with highest prevalence in fourth lactation (32.14%). Increasing evidence of mastitis with advanced age was recorded by Hawari and Al-Dabbas [7]. This may be ascribed to gradual loss in the immune system in the body of the animal with the increase in lactation number, which makes it susceptible to infection. Moreover, the median ligaments which provide support to the teat also get relaxed with age leading to hanging of udder with age and making it more prone towards the mastitis. In the present study, according to WST, the highest incidence was recorded in fourth and above lactations (63.04%) and least in first lactation (52.94%). Similar findings were reported by Rauf *et al.* [26] who reported lowest incidence in first lactation (31.1%) and highest in fifth and above lactations (77.8%). With SFMT, highest incidence was

recorded in fourth and above lactations (58.7%) and least in the first lactation (47.06%) in the current study (table 4). These findings are in agreement with Kurjogi and Kaliwal [14] who reported highest prevalence of SCM in cows with parity number 5 by WST and SFMT. According to CMT, the highest incidence was recorded in mid lactation (69.12%) followed by early lactation (66.67%) and least in late lactation (62%) (table 5). Similar findings were reported by Kayesh *et al.* [12] who recorded highest prevalence of subclinical mastitis in mid lactation (32.50%). Joshi and Gokhale [11] reported highest incidence of 59.49% in cows in 4th to 5th month of lactation. The highest incidence in the mid lactation in the present study could be due to stress of peak milk production. However, highest incidence of 42.59 per cent was reported in early lactation followed by late lactation (31.48%) and least of 25.92 per cent in mid lactation by Sharma *et al.* [30] which could be ascribed to entry of organisms into udder during the early days of dry period as keratin plug at teat orifice is formed after 7 days of last milking and also due to delayed diapedesis of polymorphonuclear neutrophils into the infected mammary gland. According to Ratna [25], animals in early stage of lactation were more susceptible. Saini *et al.* [27] reported that incidence of subclinical mastitis tended to increase with lactation number, and to be highest in early and late lactation.

Table 4: Animal wise incidence of subclinical mastitis in relation to lactation number

S. No	Lactation number	No. of cows tested	CMT		WST		SFMT	
			No. of cows positive	Incidence (%)	No. of cows positive	Incidence (%)	No. of cows positive	Incidence (%)
1.	First lactation	17	11	64.71	9	52.94	8	47.06
2.	Second lactation	25	16	64.00	15	60.00	14	56.00
3.	Third lactation	48	32	66.67	28	58.33	26	54.17
4.	Fourth lactation	46	31	67.39	29	63.04	27	58.70
	Total	136	90	66.18	81	59.56	75	55.15

In the present study, WST and SFMT recorded highest incidence during late lactation (62% and 58%), followed by mid lactation (58.82% and 54.41%) and least in early stage of lactation (55.56% and 50%), respectively (table 5). These findings were in accordance with Hoque *et al.* [8] who recorded highest incidence (64.7%) during the late lactation

stage. Similar findings were reported by Khanal and Pandit [13] who reported higher incidence in late lactation period (58.5%) followed by early lactation (41.3%). The high rate of SCM in late lactation might be due to cow to cow transmission of contagious pathogens and also due to more vulnerability of the animal to udder infections.

Table 5: Animal wise incidence of subclinical mastitis in relation to stage of lactation

S. No	Stage of Lactation	No. of cows tested	CMT		WST		SFMT	
			No. of cows positive	Incidence (%)	No. of cows positive	Incidence (%)	No. of cows positive	Incidence (%)
1.	Early lactation (15-90) days	18	12	66.67	10	55.56	9	50.00
2.	Mid lactation (90-180) days	68	47	69.12	40	58.82	37	54.41
3.	Late lactation (> 180) days	50	31	62.00	31	62.00	29	58.00
	Total	136	90	66.18	81	59.56	75	55.15

In the present study, the incidence of subclinical mastitis as per quarter disposition by CMT was highest in the right hind quarter (36.57%), followed by left fore quarter (35.88%), right fore (34.07%) and least in the left hind quarter (33.58%). These findings are in accordance with Pravindra and Upadhyay [22] who reported that right hind quarter (37.09%) was most affected followed by left hind quarter (27.74%). Similarly, Patel *et al.* (2000) reported highest incidence in the RH (15.07%), followed by LH (14.52%), RF (13.07%) and least in the LF (11.08%). However, highest incidence in the left fore quarters (34.92%, 50.67% and 32.3%) was reported

by Khanal and Pandit [13], Shittu *et al.* [31] and Siddique *et al.* [32], respectively. The greater susceptibility of the fore quarters was explained by the fact that they are larger in capacity and secrete more milk. In the present study the quarter wise incidence as per WST was 33.59 per cent (LF), 32.09 per cent (LH), 31.85 per cent (RF) and 34.33 (RH) per cent, respectively. Whereas, with SFMT the decreasing order of incidence viz., 32.09% in LH, followed by RH (31.34%), RF (30.37%) and least in the LF (28.24%) quarters. These findings are in agreement with Muhammad and Khan [17] who recorded 34.7, 27.8, 19.4 and 18.1 per cent incidence in the

LH, RH, RF and LF, respectively. In the present study incidence was more in the right sided quarters (35.32%, 33.09% and 30.86%), followed by left sided quarters (34.72%, 32.83% and 30.19%), by CMT, WST and SFMT, respectively. The higher incidence of SCM in right side quarters could be ascribed to the fact that cows mostly sit on right side with the result these quarters are frequently exposed to dung and soil moreover due to pressure of the body of animal the milk dribbles out through the teats of high yielders

and thus increasing their susceptibility. Current findings showed that the incidence of SCM was highest in hind quarters (35.07%, 33.21% and 31.72%), compared to fore quarters (34.96%, 32.71% and 29.32%), respectively (table 6), by CMT, WST and SFMT. These findings are in accordance with Saini *et al.* [27] and Sharma *et al.* (2012a) [38] who reported highest incidence in hind quarters. Similarly, Joshi and Gokhale [11] also reported that hind quarters were more affected (56.52%) than fore quarters (43.47%).

Table 6: Incidence of subclinical mastitis in relation to quarter disposition

S. No	Type of Quarter	No. of quarters tested	CMT		WST		SFMT	
			No. of quarters positive	Incidence (%)	No. of quarters positive	Incidence (%)	No. of quarters positive	Incidence (%)
1.	Left Fore	131	47	35.88	44	33.59	37	28.24
2.	LH	134	45	33.58	43	32.09	43	32.09
3.	RF	135	46	34.07	43	31.85	41	30.37
4.	RH	134	49	36.57	46	34.33	42	31.34
5.	Left (both)	265	92	34.72	87	32.83	80	30.19
6.	Right	269	95	35.32	89	33.09	83	30.86
7.	Fore	266	93	34.96	87	32.71	78	29.32
8.	Hind	268	94	35.07	89	33.21	85	31.72

Table 7: Quarter wise distribution of subclinical mastitis

S. No	Quarter distribution	Total no. of animals examined	CMT		WST		SFMT	
			No. of quarters positive	Incidence (%)	No. of quarters positive	Incidence (%)	No. of quarters positive	Incidence (%)
1.	Single quarter	136	27	30	25	30.86	33	44
2.	Two quarters	136	39	43.33	41	50.62	21	28
3.	Three quarters	136	18	20	12	14.82	9	12
4.	Four quarters	136	6	6.67	3	3.70	12	16
	Total		90	66.18	81	59.56	75	55.15

In the current study, two quarter (43.33% and 50.62%) infection was more followed by single quarter (30% and 30.86%), three (20% and 14.82%), and least in four quarters (6.67% and 3.7%) according to CMT and WST, respectively. Langer *et al.* [15] reported highest prevalence in two quarters (47.8%), followed by single (32.6%), three (13%) and least in four quarters (6.5%) with CMT. These findings are in close approximation to those reported by Patel [20]. However, reports of Rauf *et al.* [26] showed highest incidence in single quarters and least in four quarters with WST. As per SFMT, present findings showed highest incidence in single quarters (44%), followed by two (28%), four (16%) and least in three quarters (12%) (table 7). These findings are in agreement with Kurjogi and Kaliwal [14] who reported that highest incidence of bovine mastitis was in single quarter (28.2%) followed by two (12.8%), four (8%) and the least in the three quarters (5.1%). The fact that single quarter with higher incidence is an indication that possibly one quarter is usually first infected and the others become affected through contamination and other means especially during the milking procedures [31]. The difference in quarter wise prevalence of mastitis is probably due to the fact that predisposing factors like injury, defective sphincters, and so forth could vary from quarter to quarter [9].

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