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A Review on Sub Clinical Mastitis in Dairy Cattle

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ABSTRACT

Subclinical mastitis is the most prevalent and economically destructive disease in dairy cattle throughout the country. It is 3–40 times more common than clinical mastitis and causes the greatest overall losses in most dairy herds. It is a multi etiological complex disease which consists infectious and noninfectious agents as potential risk factors. The prevalence of subclinical mastitis in cows increases with increased milk production, unhygienic management practices and with increasing number of lactation. There are no visible changes in the udder or milk but it reduces milk production and adversely affects milk quality. Early detection of sub clinical mastitis can be done by various indirect and direct tests.

Key words: *Sub clinical mastitis, Dairy cattle, Milk production*

INTRODUCTION

Sub clinical mastitis in dairy cattle is a major and silent problem causes higher economic losses to the farmers. It is one major reason for low yield and poor quality milk and ranks first among the diseases that causes substantial loss to owners. Mastitis is defined as inflammation of parenchyma of mammary glands and is characterized by physical, chemical and usually bacteriological changes in milk and pathological changes in glandular tissues[1]. It is a global problem as it adversely affects on animal health, quality of milk and economics of milk production and every country including developed ones suffers huge financial losses related to culling, decreased production, decreased fecundity, and treatment costs[2]. Besides causing huge losses to milk production, the sub clinically affected animals remain a continuous source of infection to other herd mates[3].

Some studies have been reported that the incidence of sub clinical mastitis ranged from 19.20 to 83% in cows. In India, about 70-80% economic loss has been attributed due to sub clinical mastitis alone[4].

It is also a complex disease, with various causal pathogens, and given its complexity. However complete eradication at present is not feasible[5]. So, it is essential to understand the important risk factors associated with management practices for incidence of sub clinical mastitis in dairy cattle. It does not create visible changes in the milk or of the udder[6]. Although the milk appears normal, cows with subclinical intramammary infections (IMI) produce less milk and with compromised quality[7]. Subclinical mastitis can lead to a 10% – 20% decrease in milk production. In addition, it has an undesirable effect on the constituents and nutritional value of the milk, rendering it of low quality and less fit for processing[8]. As there are no visible abnormalities in the milk, subclinical mastitis requires special diagnostic tests for detection[9]. The importance of early detection of mastitis, and in particular subclinical mastitis, is critical[10] because changes in the udder tissue take place earlier than they become apparent[11]. It cannot be identified without a laboratory or field test, mostly remains unnoticed by the farmer, therefore considered as a hidden form of mastitis.

PREVALENCE OF SUB CLINICAL MASTITIS

Sub clinical mastitis is 15 to 40 times more prevalent than clinical mastitis[12]. According to Cynthia13 the cases of SCM varied from 15 to 75 %, whereas the involvement of quarters having SCM varied between 5 and 40 %. Five states, namely Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, and Maharashtra had estimates of 53.52%, 51.18%, 39.58 %, 62.49 % and 35.11 % respectively. Meta-analysis of state-wise prevalence data showed that Punjab and Haryana had harmonized prevalence of subclinical mastitis on cow-basis[14]. According to Busato *et al*.[15] the prevalence of sub clinical mastitis at the quarter level were 21.2% for lactation period of 7 to 100 days and 34.5% for 101 to 305 days post partum in organic certified dairy farms. According to Varshney and Narsh[16], prevalence of subclinical form of mastitis was found to be more common in India (varying from 10-50% in cows and 5-20% in buffaloes) when compared to clinical mastitis (1-10%). Various researchers have reported about the prevalence of subclinical mastitis in dairy cows (Table 1).

RISK FACTORS OF SUB CLINICAL MASTITIS

Risk factors such as Host ((breed, high yielder, age, parity, stage of lactation, udder defense, udder confirmation, Milking interval, Milk somatic cell count, Dry period, teat injuries, genetic resistance), Pathogen (virulence factor, number of organisms, blind treatment), management practices (shed and udder hygiene, poor teat condition, poor environmental hygiene, sanitation, large herd size, use of hand wash cloth, improper teat dipping, milking technique, milking machine) and diet (Cu, Co, Zn, Selenium and vitamin E deficiency) amongst others have been reported to be important in the prevalence of sub-clinical mastitis[17].

CAUSATIVE AGENTS OF SUB CLINICAL MASTITIS

In a report of Kumar et al.[18] *Streptococcus dysgalactiae* was major (50.00%) organism isolated from the cases of sub clinical mastitis in cows followed by *Staphylococcus aureus* and others. It may also be associated with many other organisms including *Actinomyces pyogenes, Pseudomonas aeruginosa*, *Nocardia asteroides*, *Clostridium perfringens* and others like *Mycobacterium*, *Mycoplasma, Pastuerella* and *Prototheca* species and yeasts[17]. The majority of the cases are caused by only a few common bacterial pathogens, namely, *Staphylococcus species, Streptococcus* species, Coliforms and *Actinomyces pyogenes*[19].

DIFFERENT DIAGNOSTIC TESTS FOR DETECTION OF SUB CLINICAL MASTITIS (SCM)

According to the International Dairy Federation (IDF) recommendations, microbiological status of the quarter and the somatic cell count (SCC) are the most common tests to detect changes in the milk because of an inflammatory process[20]. Over a period of years many tests have been developed for the diagnosis of SCM. According to Langer et al.[6], there are several direct and indirect tests that can detect SCM. Indirect tests are useful in determining the quality of milk, and in the absence of laboratory facilities those which are suitable for use in the field may be helpful in detecting[21]. They include cow side tests *viz.,* Modified California Mastitis Test (MCMT), Modified White Side Test (MWST), Surf Field Mastitis Test (SFMT), screening tests viz., Electrical conductivity (EC), pH test and laboratory test viz., Methylene Blue Reduction Test (MBRT). Inflammation of mammary gland is directly accompanied by an increase of SCC in milk[22]. Therefore, many reports have considered SCC as a significant marker for SCM[23] and signifies a direct test for detection of SCM. Various researchers have reported the prevalence of SCM on the basis of different tests (Table2).

ECONOMIC LOSS DUE TO SUB CLINICAL MASTITIS

In India, economic loss due to mastitis was reported INR 6,053.21 crore, where majority of loss was found due to sub-clinical mastitis (70 to 80%) which accounted around INR 4,365.32 crore[4]. Economic loss due to sub-clinical mastitis in crossbred cows was INR 592.87 per lactation and loss due to decrease in milk production was INR 700.18[24]. Annual losses in the dairy industry due to mastitis was almost 2.37 thousand crore rupees in India. Out of this, sub-clinical mastitis accounted for approximately 70% of the loss[25].

Table 1: Prevalence of Subclinical mastitis in various parts of India

Place of study	Animals	SCM cases (%)	References
West Bengal	Jersey cross	62.80	Roy *et al.*[26]
Orissa	Cattle & Buffalo	42.10	Misra *et al.*[27]
Uttaranchal	Cows	74.10	Nauriyal[28]
Madhya Pradesh	Jersey cross	86.87	Devi *et al.*[29]
	H.F	75.00	
	Malvi	57.35	
	Sahiwal	75.00	
	Gir	80.00	
Gujarat	Black Bengal goats	70.04	Patel *et al.*[30]
Madhya Pradesh	Cows	52.48	Ghosh and Sharda[31]
Haryana	Sahiwal	55	Ghosh *et al.*[32]
Jammu	Cows	78.54	Sharma[33]
Rajasthan	Cows	60.25	Chahar *et al.*[34]
Jabalpur	Buffaloes	27.90	Das and Joseph[35]
Haryana	Karan Fries cows	53.03	Samanta *et al.*[36]
Uttarakhand	Cows	34.48	Yathiraj *et al.*[37]
Bombay	Buffalo	16.66	Ahire *et al.*[38]
Raipur	Buffaloes	39.53	Viswakarma[39]
Chennai	Bovine	27.86	Dutta[40]
Ranchi	Cows	27.27	Kumar *et al.*[18]
		59.87	Sahoo et al.[41]
Durg	Buffaloes	57.27	Sharma and Maiti[42]
Haryana	H.F.C & I	39.80	Sharma et al.[17]
Uttar Pradesh	Cows	42.93	De & Mukherjee[43]
Pondicherry	Bovine	33.83	Krithiga et al.[44]
Jharkhand	Bovine	27.37	Ranjan et al.[45]
Pune	Crossbred cows	9.88	Sinha et al.[25]
Jammu	Cows	41	Gupta et al.[46]

Table 2: Detection of Subclinical mastitis by different diagnostic tests

Place of study	No. of test sample	SCC	MCMT	EC	pH	MWST	SFMT	References
Jammu & Kashmir	90 animals		14.77			15.90		Sudhan *et al.* [47]
Ludhiana	73 animals			69.38				Singh *et al.*[48]
Chattisgarh	358 Samples	85.23	82.55			78.86		Sharma *et al.*[22]
Hissar	72 crossbred cows	80.39	80.90	71.42	87.65			Jain *et al.* [49]
Hissar	92 crossbred cows	31.52	43.48	47.82				Sindhu *et al.* [50]
Jammu	335 crossbred cows	53.73	67.75			77.91		Sharma *et al.*[51]
Bengaluru	263 Sample	45		62				Hedge *et al.* [52]
Dharwad (Karnataka)	263 cows					39.1	46	Kurjogi and Kaliwal [53]
Andhra Pradesh	135 dairy cattle	48.14	36.25	44.06	57.11			Reddy *et al.*[54]
Karnataka	190 quarters	48.4	45.8	40	61.1			Preethirani [55]
Hyderabad	136 cows		66.18			59.56	55.15	Anusha *et al.*[56]

CONCLUSION

The subclinical mastitis (SCM) is a more serious and responsible for much greater loss to the dairy industry. More than three times losses due to SCM, as compared to clinical mastitis occurs. In this form of mastitis as milk appears normal and visible abnormalities such as udder swelling, hardness of the affected quarter, pain, and watery milk remains absent, but physical and chemical changes occurs in the milk, which helps in the detection of SCM by various diagnostic tests.

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