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Therapeutic efficacy of various treatment protocols in cows suffering from sub clinical mastitis

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Abstract
The present study was conducted during December 2020 to June 2021 in Amethi and Sultanpur district (U.P) by screening a total number of 200 cows for sub clinical mastitis in cows by using CMT and WST. Forty animals among the positive for sub clinical mastitis were selected randomly and divided into four groups of 10 animals each and therapeutic efficacy of different antibiotics with nutritional supplement compared. Among different treatment group maximum efficacy was observed in group III (100%) in which amoxicillin-sulbactam with nutritional supplement given where all the animal recovered completely followed by group IV (90%), group I (80%), group II (70%).

Keywords: Cows, sub clinical mastitis, therapeutic efficacy, CMT, WST

Introduction

It is believed that Mastitis is the most devasting disease condition that causes economic loses throughout the world (Kumar *et al*., 2010) [1]. In India, approximately Rs. 6,702 million per annum loss due to mastitis (Yathiraj, 2006) [2]. Higher losses in indigenous cow from mastitis (Rs.1695 per cow) as compared to cross bred (Rs.1597.64 per cow) (Jingar *et al*., 2018) [3]. When comes to Clinical mastitis, abnormal milk is immediately detected, however in sub-clinical mastitis, no change in the milk is manifest, but in both cases reduction in milk production occurs. In sub-clinical mastitis, the reduction in milk production account for 70%-80% of the total losses (Philpot and Nickerson, 1991) [4]. Subclinical mastitis is identified by change in milk composition (Somatic cell count, leukocytes and epithelial cells, changes in milk pH and ion concentration) with no any clinical signs of milk abnormalities. In healthy lactating mammary gland, the milk somatic cell count is often 1,000,000 cells/ml of milk during subclinical mastitis. The presence of intra mammary infections is the major cause of Sub clinical mastitis at the herd and individual level (Guidry, 2007) [5]. The average milk yield loss was 2.58 liters/day in sub-clinical mastitis (Das *et al.,* 2018) [6]. A lactating cow which affected with Subclinical mastitis is expected to produce approximately 2.58 liter/day less milk causing a loss of rupees 2,322 to 7,824 per cow a month (Bardhan, 2013 and Das *et al.* 2018) [6]. In India Prevalence of subclinical form of mastitis was found to be more common (varying from 10-50% in cows and 5- 20% in buffaloes) compared to clinical mastitis (1-10%) (Varshney and Narsh 2004) [7]. The standard treatment is antibiotic therapy, accompanied by drainage of milk from udder (Sahay *et al*., 2006 and Hawari and Fawzi, 2008) [8, 9]. Therapeutic cure of mastitis is commonly by administration of intermuscular or intravenous injection, intramammary infusion done by of antibiotics such as penicillin, ampicillin, streptomycin, cloxacillin (Bhosale *et al.,* 2014) [10]. Ceftriaxone was most effective against *S. aureus* (96.01%) isolates followed by *E. coli* (95%), *P. aeruginosa* (92.07%), *K. pneumoniae* (89.04%), and (87.02%) *P. mirabilis* shows lowest susceptibility amongst all (83.08%) (Masood and Aslam, 2010) [11]. Highest number of coagulase-negative staphylococci (CNS) were susceptible to Ceftriaxone and had lowest susceptibility to Penicillin (Kaliwal *et al.,* 2011) [12].

Materials and Methods

The present study was conducted during December 2020 to June 2021 by screening a total number of 200 sub clinical cases of mastitis in cows. Milk samples were collected from Amethi and Sultanpur district of Uttar Pradesh.

Ethical approval
The research work was duly permitted by the Institutional Animal Ethics Committee (IAEC) *viz.* Approval No: IAEC/C.V.Sc/P-14/2020/, dated- 18.12.2020.

Selection of animals
Animals were screened by based on cow side tests namely California Mastitis Test (CMT) and White Side Test (WST) and the physical examination of udder was performed for abnormality of udder and teat (Schalm *et al*., 1971) [13]. The area for study were at Sultanpur and Amethi districts of Uttar Pradesh Milk samples will be collected from lactating cows with the history of decreased in milk yield but shows no visible physical abnormality in udder and changes in milk. On the basis of stratified random sampling technique two blocks were selected from each district followed by two villages from each block and twenty-five samples were collected from each village (total 200 samples).

Table 1: Selection of lactating cows

Name of district	Name of block	Name of villages	No. of Screened cows
Amethi	Musafirkhana	a. Mubarackpur	25
		b. Rudauli	25
	Gauriganj	a. Achal pur	25
		b. Babupur	25
	Total		100
Sultanpur	Dostpur	a. Bethra	25
		b. Pratap pur	25
	Kadipur	a. Laxamanpur	25
		b. Daudpur	25
	Total		100
	Total		(100 + 100)

Clinical examination of udder of Cows
A thorough examination of udder was performed for the detection of any abnormality in the udder *viz.* presence of any lesion, pain, heat and swelling. Milk from each quarter was stripe out for detecting the abnormality in the milk like color and consistency. These examinations were continued until final selection of those cows which revealed sub-clinical signs (Radostits *et al*., 2007) [14].

Therapeutic study
Forty animals among the positive for subclinical mastitis were randomly divided into four group of ten animals each as per following schedule.

Table 2: Different Treatment protocol groups

Group	Number of animals	Treatment
I	10	Inj. amoxycillin-Sulbactam 10mg/kg B/W I/M OD X 5days.
II	10	Inj. Ceftriaxone @10mg/Kg B/W I/M X 5days.
III	10	I + Liq. Acrovet* @10ml PO OD X 10 days.
IV	10	II + Liq. Acrovet @10ml PO OD X 10 days.

*Vitamin A, 200000 IU, Vitamin D_3 100000 IU, Vitamin H 250 mcg, Sodium salinate (Novitech)

As per treatment administered protocol Group first animal cows were given Injection amoxycillin-Sulbactam @ 10 mg/kg Body weight intramuscular once in a day for five days. Cattle of group second were administered Injection Ceftriaxone @10 mg/Kg body weight intramuscular once in a day for five days. In group third given nutritional supplement liquid Acrovet @ 10 ml orally for 10 days along with the group first and in group fourth given nutritional supplement liquid Acrovet @ 10 ml orally for 10 days with group second.

Result and discussions
The efficacy of various treatment protocol was examined using series of tests namely California Mastitis Test (CMT) and white side test (WST) was performed both pre as well as post therapy and results were compared statistically. Maximum efficacy was observed in Group III in which antibiotics amoxycillin-sulbactam with nutritional supplement. Where all the animals recovered completely i.e, 100 percent and the CMT score point decreased significantly from 2.9±0.31 to 2±0.42 and WST decreased to 0.1±0.31 from 2.8±0.42 followed by group IV in which 90% recovery was recorded. The CMT score point decreases significantly from 2.7±0.48 to 0.3±0.48 and WST decreased to 0.2±0.42 from 2.6±.51. In only antibiotics groups (Group I and II) higher recovery were recorded in Group I. In group I the CMT score point decreases significantly from 2.6±0.51 to 0.5±0.52 and WST decreased to 0.6±0.51 from 2.5±0.52 and in group II the CMT score point decreases significantly from 2.4±0.51 to 0.9±0.31 and WST decreased to 0.9±0.31 from 2.1±0.3.

Table 3: Pre and post treatment CMT score point, WST score point

Treatment Group	No. of animal	CMT score point		WST score point	
		Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
I	10	2.6± 0.51	0.5±0.52	2.5±0.52	0.6±0.51
II	10	2.4±0.51	0.9±0.31	2.1±0.31	0.9±0.31
III	10	2.9±0.31	0.2±0.42	2.8±0.42	0.1±0.31
IV	10	2.7±0.48	0.3±0.48	2.6±.51	0.2±0.42

Table 4: Percent recovery status of treatment groups

Treatment Group	No. of animal	No. of recovered animal	% Recovery
I	10	8	80
II	10	7	70.00
III	10	10	100.00
IV	10	9	90
Total	40	33	82.5%

In only antibiotics groups (Group I and II) higher recovery were recorded in Group I. The recovery rate in decreasing order was Group III (100%) and Group IV (90%), Amoxycillin-sulbactam group treated group (Group I) 80.00% followed by ceftriaxone treated Group II (70%). In treatment of mastitis Amoxicillin (AMX) singly or in combination with Sulbactam (SUL) (β-lactamase inhibitors) is useful to kill the mastitis causing pathogenic organism. (Roberson *et al.* 2004 and Sharma *et al.* 2010) [15, 16]. Singh *et al.* (2013) [17] reported a recovery of 84.61% and 86.95% recovery rate respectively after 7 days therapy with potentiated Amoxicillin *i.e*., Amoxicillin and Sulbactam combination.

Ceftriaxone, a bactericidal third generation cephalosporin, exhibited 100 percent animal wise and quarter wise therapeutic cure following a treatment period of five days (Dasohari *et al.,* 2017) [18] by administration of intramuscular injection. In opposite to above reports, low clinical and bacteriological cure rate of 82.35 percent and 66.66 percent was reported by Charaya *et al*. (2015) [19].

Conclusion
Subclinical mastitis remains an economically condition for dairy industries. Subclinical mastitis can be identified by change in milk composition (Somatic cell count leucocytes, and epithelial cells, change in milk pH and ion concentration) with no any visible abnormalities in milk. Amoxicillin and Sulbactam combination with nutritional supplement can be used for treatment of subclinical mastitis. Both California mastitis test and White side test are reflection of subclinical mastitis status and their decline is indicative of improvement in their health.

Acknowledgement

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