

EFFICACY EVALUATION OF TOPICAL HERBAL SPRAY IN SUB CLINICAL MASTITIS IN BOVINES

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ABSTRACT

A clinical trial was conducted to evaluate the comparative therapeutic efficacy of herbal spray AV/AMS/15 and Brand A against subclinical mastitis (SCM). A total of 30 cows were screened as per the guidelines of International Dairy Federation (IDF) having 10 healthy cows, kept as control group T0, 20 cows were exhibiting the signs of subclinical mastitis, divided in to 2 groups T1 and T2. Group T1 having 10 cows suffering from SCM and treated with 'Brand A' (gel), applied gently by massaging the udder after each milking, BID for 5 days. Group T2 having 10 cows suffering from SCM and treated with herbal spray 'AV/AMS/15' (M/S Ayurvet Limited, India) after each milking BID for 5 days. Parameters viz; bacteriological culture study (isolation and investigation), modified California mastitis test (MCMT), Mastrip test, somatic cell count, milk yield and milk fat % were studied on the day 0, 5th, 14th and 21st. Result revealed that efficacy of herbal spray AV/AMS/15 in the treatment of subclinical mastitis was higher than Brand A treated group.

KEYWORDS: SCM, SCC, milk yield, milk fat %, MCMT.

INTRODUCTION

Bovine mastitis defined as 'parenchymal inflammation of the mammary gland' is characterized by a range of physical and chemical changes of the milk and pathological changes in the udder glandular tissues.^[1] Mastitis, one of the most widespread, expensive and common endemic diseases affecting dairy herds worldwide.^[2,3] According to the clinical symptoms mastitis may be classified as clinical mastitis or sub-clinical mastitis. In general clinical mastitis is characterized by rapid onset, inflammation, reddishness of the udder, fever, despair, anorexia, reduced and altered milk discharge from the affected quarters. In addition the milk may have fibrin clots, flakes, off colour, bloody or of watery in consistency. The sub clinical mastitis on the other hand have no visible signs either in the udder or in the milk, but decrease of milk quality and quantity may be observed. Subclinical mastitis usually leads the clinical form as it is of longer period, difficult to diagnose, adversely affects milk production and quality and comprises a reservoir of pathogens that lead to disease of other animals within the herd.^[4] Mastitis is the most cost intensive production disease in dairy industry, causing a considerable financial burden in terms of reduced milk production, discarded milk, early cow replacement costs, reduced cow sale value and to a lesser extent, from the

culling of continually infected cows, veterinary services, cost of veterinary treatment, drugs, labour and penalties on milk quality.^[5,6] The fact is evidenced from a recent report where in annual economic losses sustained by dairy industry in India on account of udder infections have been projected about Rs. 6053.21 crores. Out of this, loss of Rs. 4365.32 crores (70%-80% loss) was credited to sub clinical version of udder infections.^[7] The economic losses due to sub-clinical mastitis – the loss per animal was estimated to be INR 1,390. 49% of this loss per animal was on account of loss of value from milk production and 37% expenses on veterinary medicines.^[8] Subclinical mastitis according to Shearer & Harris (2003) is important due to the fact that it is 15 to 40 times more prevalent than the clinical form.^[9] It is important to be aware of the fact that being an infectious disease, all methods of commercial milk production provide suitable breeding conditions for mastitis organisms and thus spread mastitis from cow to cow. The incidence of disease is the result of interplay between the infectious agents and management practices stressing proper udder defence strategies. Subclinical mastitis can be detected by monitoring the number of somatic cells in the milk (Somatic Cell Count-SCC).^[10] Mastitis in dairy cattle's takes place when the udder becomes inflamed as a result of pathogenic (most often bacterial) invasion of the teat canal. These bacteria once

inside the teat canal migrate up the teat canal and colonize and multiply in the alveoli. These colonized organisms then produce toxic substances, which causes injury to the milk secreting tissue besides physical trauma and chemical irritants.^[4] Control of bovine mastitis is constrained because of multiple etiological agents. Another issue highlighted is the lack of awareness among farmers of the subclinical form of the disease, and this aspect is of fundamental importance because of the possibility of spreading infectious agents through the herd. The lack of medical treatment means, as demonstrated, an increase in the occurrence of mastitis cases on the farm, a consistent decrease in milk yield (up to 33% per quarter infected), a public health risk due to consumption of unsafe milk, and less efficient processing of milk.^[11] SCC has been accepted as the best index to use to predict udder infection in cows, and has been used extensively as an indicator since the 1960s.^[12] Under field conditions, determination of SCC in milk is usually done using the California Mastitis Test (CMT); in fact, CMT scores are directly related to average SCC.^[13]

Antibiotics are used for the treatment and control of mastitis, but intramammary infusion of antibiotics for mastitis therapy was cited as a major reason for milk contamination^[14] and frequent use of antibiotic therapy leads to antibiotic resistance.^[15] Increasing emergence of antibiotic resistant pathogens^[16] is further suspected to complicate the effectiveness of the mastitis treatment. Certified organic dairies are restricted from antibiotic use and thus must use an alternative to antibiotics. Teat disinfection after milking is one of the five plans of mastitis control by National Institute for Research into Dairying (NIRD).^[17] Several herbal extracts have shown in vitro antibacterial activity versus major mastitis pathogens.^[18] WHO has also emphasized on the use of medicinal plant as an alternative to antibiotic. To prevent the milk contamination and antibiotic resistance, proposed study was conducted to assess the herbal spray 'AV/AMS/15' for the treatment of mastitis.

MATERIAL AND METHOD

A total of 30 cows were screened as per the guidelines of International Dairy Federation (IDF) having 10 healthy and 20 cows were exhibiting the signs of subclinical mastitis, divided in to 3 groups, T0, T1 and T2. Group T0 having 10 healthy cows, kept as control and no treatment was given, group T1 having 10 cows suffering from SCM and treated with 'Brand A' (gel), applied gently by massaging the udder after each milking, BID for 5 days. Group T2 having 10 cows suffering from SCM and treated with herbal spray 'AV/AMS/15' (M/S Ayurved Limited, India) after each milking BID for 5 days. Parameters viz; bacteriological culture study, modified California mastitis test (MCMT), Mastrip test, somatic cell count, milk yield and milk fat % were studied on the

day 0, 5th, 14th and 21st. Therapeutic efficacy was determined on the basis of improvement in the somatic cell count, milk yield and milk fat content.

RESULT AND DISCUSSION

Bacteriological culture

Amongst all the positive animals from all the groups it was found that most of the cases (82%) were found positive for the staphylococcus aureus, 8% for the streptococcus spp., 6% for the Mycoplasma spp., 2% for the Ecoli and 2% for the klepsilla species. In 'Brand A' treated group T1 before treatment on day 0 all the animals were positive whereas after the treatment on day 14th and also on the day 21st only 2 animals were found to be positive for the staphylococcus spp., streptococcus spp. and E-coli in the cultural examination. In the herbal spray AV/AMS/15 treated group T2 initially on day '0' all the animals were positive and after the treatment on day 14th and also on the day 21st only 1 animal found to be positive for the E-coli in the cultural examination. High recovery % in the animals of AV/AMS/15 treated group is may be due to the antibacterial, antifungal, antiseptic and anti-inflammatory property of the herbs Cedrus deodara, Curcuma longa, Eucalyptus globulus which are the constituent ingredient of the herbal spray AV/AMS/15.

Modified California Mastitis Test (MCMT)

In control group T0 all the animals were negative for the MCMT at day 0, 5th, 14th and 21st. In the 'Brand A' treated group T1 after the treatment on 5th day, 14th day and also on 21st day, 60% animals were found to be positive. In the AV/AMS/15 treated group T2 after the treatment on 5th day 60% animals were positive and only 20% remained positive at 14th day whereas on day 21st it was only 10% remained positive. Data shows the high antimicrobial potential and anti-inflammatory properties of AV/AMS/15 against the subclinical mastitis.

Mastrip test

Table 1: Mastrip findings.

Group	% Animals recovered / negative for the Mastrip test		
	Day 5 th	Day 14 th	Day 21 st
T1	50%	50%	50%
T2	70%	80%	80%

In the AV/AMS/15 treated group (T2), 80% animals were found to be negative for the Mastrip test after the treatment. Whereas in the 'Brand A' treated group T1, 50% of animals were recovered after the treatment. Higher percentage of recovered (Negative) animals in the AV/AMS/15 treated group T2 revealed the high potency of the herbal spray against the subclinical mastitis.

Somatic Cell Count (SCCx10⁵)**Table 2: Average Somatic cell count (SCC X10⁵).**

Treatment	0 day	5 th day	14 th Day	21 st day
T0	1.6778±0.26288	1.4444±0.34925	1.3222±0.27927	1.1556±0.40964
T1	6.6700±0.10225	4.1900±0.09826	6.4700±0.17324	5.5400±0.07775
T2	4.7400±0.09452	3.3000±0.06498	1.5200±.05925	1.0100±0.08622

Milk SCC has been accepted as the best index to use to predict udder infection in cows and has been used extensively as an indicator since the 1960s.^[12] Normally, in milk from a healthy mammary gland, the SCC is lower than 1×10^5 cells/ml, while bacterial infection can cause it to increase to above 1×10^6 cells/ml.^[19] Increased somatic cell count represents the response of udder tissue to the presence of pathogens causing the inflammation of udder called mastitis, reduced milk synthesis and therefore milk production.

In the control group T0 the average Somatic cell count ($\times 10^5$) ranges between 1.15 to 1.67. Average SCC ($\times 10^5$)

of 'Brand A' treated group T1 decreases from 6.67, before the treatment on day '0' to 5.54, after the treatment on day '21st' (16.94 % decrease in the SCC from day 0-21st) whereas average SCC ($\times 10^5$) of 'AV/AMS/15' treated group T2 decreases from 4.74, before the treatment on day '0' to 1.01 after the treatment on day '21st'. (78.52% decrease in the SCC from day 0-21st). Decrease in the average SCC is due to the antimicrobial and anti-inflammatory properties of the herbal ingredients of Cedrus deodara, Curcuma longa and Eucalyptus globules plants which are the component ingredients of the herbal spray AV/AMS/15.

Milk Yield**Table 3: Milk yield during the study period between the treatments.**

Group	Milk Yield (Litre/day)			
	Day 0	Day 5	Day 14	Day 21
T0	7.7780±.07412	8.0889±.07536	8.0222±.11759	8.2695±.25969
T ₁	8.0000±.0830	8.3100±.06741	8.6600±.05416	8.0200±.09043
T ₂	9.0400±.11566	9.3400±.13679	9.3900±.14716	10.6300±.07000

There was a significant increase in the average milk production AV/AMS/15 treated group T2, from 9.040 L/day on day 0 to 10.63 L/day on day 21st. Whereas there was no significant increase in the average milk production of 'Brand A' treated group T1 and control group T0. Significant increase in the average milk production is may be due to anti-inflammatory and antimicrobial property of the ingredients (Cedrus deodara, Curcuma longa and Eucalyptus globules) of herbal spray AV/AMS/15 which leads to quick recovery of the mammary glands from the infection and inflammation consequent upon which mammary gland becomes healthy and more milk produced by the gland.

Milk Fat %

Group	Milk fat %			
	Day 0	Day 5	Day 14	Day 21
T ₀ No treatment	3.6	3.7	3.6	3.5
T ₁ Brand A	3.4	3.4	3.4	3.5
T ₂ erbal Spray AV/AMS/15	3.2	3.7	3.8	4.1

There was a significant increase in the average milk fat % in AV/AMS/15 treated group T2 after the treatment. The average milk fat % of AV/AMS/15 treated group T2 on day 0, 5th, 14th and 21st were 3.2, 3.7, 3.7, 3.8 and 4.1 respectively. Average milk fat % after the treatment was higher in the AV/AMS/15 treated group T2 (4.1) as compared to 'Brand A' treated group T1 and control

group T0 (3.5). Data reveals the better potency of herbal spray AV/AMS/15 against subclinical mastitis as it helps in the recovery from the disease and also maintains the quality of the milk.

CONCLUSION

Result shows that the efficacy of the herbal spray 'AV/AMS/15' was better than that of 'Brand A' treated group. Herbal spray AV/AMS/15 has proven excellent in the form of improvement in the cultural characteristics, improved SCC, increased milk yield and fat %. Therefore application of the herbal spray AV/AMS/15 may be recommended to cure subclinical mastitis.

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