***Original Research Article***

**EFFECT OF TANUVAS BIOTEAT DIP ON CONTROL OF MASTITIS IN DAIRY COWS**

**ABSTRACT**

Mastitis is inflammation of the udder and is the most common economic important disease in dairy cattle. The present study was conducted at Pillipakuttai village of Namagiripettai block in Namakkal district of Tamil Nadu. The lactating cows in early lactation were screened by using TANUCHEK SCC kit for intramammary infection by somatic cell count. A total of 40 cows with no intramammary infection were selected for this study and divided into three groups. Group I was kept as control with 10 animals which did not receive post-milking teat dipping. Group II and III were the treatment groups having 15 cows each. In group II post milking teat dipping was done with one percent potassium permanganate and in Group III with a Bioteat dip solution. The overall SCC count after treatment was significantly (P<0.01) decreased SCC count <200 (103 cells/ml) compared to control at the end of three months. The overall pH was higher in control group followed by potassium permanganate group and bioteat dip group after treatment. The overall milk yield was significantly (P<0.01) higher in treatment groups compared control after treatment. The herbal teat treatments performed better than the chemical teat dipping and no teat dip.

**Key words:** Intramammary; Mastitis; Somatic; Herbal and Bioteat dip.

1. **INTRODUCTION**

The anatomical positions of the udder are more prone to inflammatory and non inflammatory conditions of the mammary glands of the udder (Sudhan & Sharma 2010). Mastitis isinflammation of the udder and is the most common economic multi-etiological disease (Gomes & Henriques 2017). The important species are Actinomyces, Pseudomonas, Nocardia, Clostridium, Mycobacterium, Mycoplasma, Pastuerella and Prototheca and yeasts etc. (Sharma et al., 2012).

Mastitis can be classified into clinical, sub-clinical, and chronic mastitis. The clinical mastitis can be easily detected by visible abnormalities, such as red and swollen udder, watery milk with flakes and clots and fever in dairy cow (Khan & Khan 2008). The clinical mastitis can be further sub-divided into per-acute, acute, and sub-acute based on degree of the inflammation (Kibebew K, 2017). In contrast to clinical mastitis, sub-clinical not showed visible abnormality in the udder or milk, but decreased milk production with increased Somatic Cell Count (Gruet et al., 2001) The sub-clinical mastitis cause more financial loss than the clinical mastitis and difficult to eliminate from the herd (Zhao &Lacasse 2008; Romeroet al. 2008). Chronic mastitis occurred at regular interval.

Prevention is very important in mastitis management in dairy farms. Presently, teat dipping is an important procedure for reduction of intra mammary infection. Teat dipping is a simple and economic procedure for mastitis control (Oliver et al., 2001).

The post milking teat dipping decrease the colonization, contamination and decrease the bacterial population on teat skin and improve the skin health of teat (Woolford 2001). Chemical teat dipping causes irritation to the teat skin and residue in the milk (Yanuartono et al., 2020). To overcome these effects herbal medicine was used to reduce the side effects and avoid residue in the milk.

There are many *in vitro* studies on herbs to antibacterial activity. However, in *vivo* study on the efficacy of herbal teat disinfectants was scant. There are few herbal teat dips available in the market and very few studies compared their efficacy with chemical teat disinfectants (Kapoor et al 2023). The ethno-veterinary preparation showed zones of inhibition against field isolates *E. coli, S. aureus* and *P. aeruginosa* (Punniamurthy et al 2017).

The current study aimed to compare the bioteat dip with chemical teat dip on SCC, pH and milk yield in dairy cows.

1. **MATERIALS METHODS**

The study was conducted at Pillipakuttai village ofNamagiripettai block in Namakkal district of Tamil Nadu. The lactating cows in early lactation were screened by using TANUCHEK SCC kit for intramammary infection by somatic cell count. A total of 40 cows with no intramammary infection were selected for this study and divided into three groups. Group I was kept as control with 10 animals which did not receive post-milking teat dipping. Group II and III were the treatment groups having 15 cows each. In group II post milking teat dipping was done with one percent potassium permanganate and in Group III with a Bioteat dip solution. Bioteat dip is a herbal nano biopolymer solution used to prevent mastitis. This solution is biodegradable, eco-friendly and consists of natural food grade material which is easily washable from the udder. The experiment was carried for 3 months. The teat of treatment cows were dipped in post milking teat disinfectant, twice daily immediately after milking with a contact time of 20-30 seconds.

The cow milk samples (30 ml) were collected from afternoon milking for SCC count and estimation of pH in the milk at weekly interval for 4 months. A drop of collected milk sample were added in a TANUCHEK SCC tube and 3 drops of enhancer was added in the milk sample, allowed to wait 30 minutes to develop colour in the sample, the developed colour was compared with colour card and somatic cell count was measured. The pH of the milk was measured by using pH papers. The milk yield of treatments and control was recorded during the experiment period.

1. **RESULTS**

The SCC in the control group and treatment groups were not significantly different before experiment. However, post milking teat dip significantly (P<0.01) decreased SCC <200 (103 cells/ml) compared to control up to three months (Table 1). Among the treatment groups Bioteat dip significantly decreased SCC compared to chemical teat dip. Further, bioteat dip showed decreased SCC from first month to third month, where as in chemical group SCC decreased only up to the end of second month. Similarly, The overall SCC count after treatment was significantly (P<0.01) decreased SCC count <200 (103 cells/ml) compared to control at the end of three months.

**Table 1.Effect of post teat dip on somatic cell count (x103 cells/mL) in different treatment groups**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatments** | **SCC count Before experiment** | **SCC count after treatment** | | | |
| **First Month** | **Second month** | **Third month** | **Total** |
| **Control** | 211 | 210c | 207c | 215c | 211c |
| **KMnO4 teat dip** | 209 | 199b | 175b | 177b | 184b |
| **Bioteat dip** | 208 | 186a | 162a | 158a | 171a |
| **Pooled SEM** | 1.13 | 2.48 | 2.95 | 3.46 | 1.77 |
| **P Value** | 0.41 | P<0.01 | P<0.01 | P<0.01 | P<0.01 |

**Table 2.Effect of post teat dip on pH in different treatment groups**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatments** | pH Before treatment | pH after treatment | | | |
| First Month | Second month | Third month | Total |
| **Control** | 6.53 | 6.52 | 6.50 | 6.53 | 6.55 |
| **KMnO4 teat dip** | 6.55 | 6.54 | 6.53 | 6.48 | 6.52 |
| **Bioteat dip** | 6.57 | 6.51 | 6.49 | 6.51 | 6.51 |
| **Pooled SEM** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **P Value** | 0.48 | 0.36 | 0.50 | 0.18 | 0.09 |

The pH values did not differ significantly between control and treatment groups before and after treatments (Table 2). The overall pH was higher in control group followed by potassium permanganate group and bioteat dip group after treatment.

Table 3.Effect of post teat dip on milk yield in different treatment groups

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatments** | Milk yield before treatment | Milk yield after treatment | | | |
| First Month | Second month | Third month | Total |
| **Control** | 8.45 | 8.41 | 8.36 | 8.11a | 8.39a |
| **KMnO4 teat dip** | 8.48 | 8.48 | 8.56 | 8.74b | 8.66b |
| **Bioteat dip** | 8.38 | 8.70 | 8.68 | 8.68b | 8.68b |
| **Pooled SEM** | 0.07 | 0.07 | 0.06 | 0.08 | 0.03 |
| **P Value** | 0.84 | 0.26 | 0.11 | P<0.01 | P<0.01 |

The milk yield did not differ significantly (P<0.01) before initiation of treatment and upto two months after initiation of treatment. However, treatment groups were significantly (P<0.01) increased milk yield compared to control at the end of three months after treatment. Similarly the overall milk yield was significantly (P<0.01) higher in treatment groups compared control after treatment.

1. **DISCUSSION**

Subclinical mastitis predicted by elevation of Somatic Cell Count (Sharma et al., 2011). SCC are composed of udder epithelial cells and white blood cells which are neutrophils, phagocytes and lymphocytes. The difference in SCC in milk determined by shift of leukocytes from blood to milk due to inflammation of mammary gland caused by bacteria (Rainard et al., 2018). SCC which differentiates the uninfected cows from infected cows (Alhussien et al., 2018). Under field conditions when the somatic cell count <200 (103 cells/ml) in milk is the threshold of healthy cows (Petzer et al., 2017). Some of the reports suggested that milk with high SCC not confirmed invasion of mastitis pathogen and there is a presence of pathogen in milk with very low SCC (Petzer et al., 2017, Oliveira et al., 2013 and Alekish et al., 2015). Hence SCC carefully interpreted with demographic characteristics of cows.

In the present study, the overall SCC count was higher in control group followed by potassium permanganate group and bioteat dip group after treatment. Similar to results of the present study (Waghmare et al., 2013, Sharma et al., 2014; Kapoor et al., 2023) who reported that, herbal teat dip decreased the somatic cell count compared to control.

In this study, there was no significant difference in pH values in control and treatment groups. Our findings are in agreement with (Kapoor et al., 2023) who reported no significant difference in pH of milk after treatment of herbal teatdip. The pH of milk is not clinically helpful for diagnosing subclinical mastitis in cattle (Ogola et al., 2007; Kandeel et al., 2019).

The treatments had higher milk yield than control by third months of treatment. Similar to results of the present study were reported (Waghmare et al., 2013;Wicaksono et al., 2019). The increase in average milk production due to the anti-inflammatory and anti-microbial properties of teat dipper which enhance recovery of the mammary glands from inflammation.

1. **CONCLUSION**

The present study concluded that, the animal receiving teat dip solution decreased SCC count and increased the milk yield compared to that of control. Among the treatments, herbal teat dipper performed better.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that no generative AI technologies such as large language models (chat, GPT, COPILOT etc) and text-to-image generators have been used during writing or editing of this manuscript.

**COMPETING INTERESTS DISCLAIMER:**

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

**REFERENCES**

Alekish, M. (2015). The association between the somatic cell count and isolated microorganisms during subclinical mastitis in heifers in Jordan. *Veterinary Medicine journal Czech*,

60(2), 71-76.

Alhussien, M.N., & Dang, A.K. (2018). Milk somatic cells, factors influencing their release, future prospects, and practical utility in dairy animals: An overview. *Veterinary World*,

11(5),562.

Gomes, F., &Henriques, M. (2016). Control of bovine mastitis: old and recent therapeutic

approaches.*Current Microbiol*ogy,72(4), 377-82.

Gruet. P., Maincent. P., Berthelot. X., & Kaltsatos. V. (2001). Bovine mastitis and intramammary

drugdelivery: review and perspectives. *Advanced Drug Delivery Reviews*, 50(3), 245-59.

Kandeel, S.A., Megahed, A.A., Ebeid, M.H & Constable P.D, (2019.Ability of milk pH to

predict subclinical mastitis andintramammary infection in quarters from lactating dairy cattle. *Journal of Dairy Science*, 102(2, 1417-1427.

Kapoor, S., Gupta, D.K., Singh, R.S., &Narang, D. (2023).A new herbal teat dip for preventing

mastitis. Indian Journal of Animal Health. 62(2), 355-363.

Khan, M., &Khan, A. (2006). Basic facts of mastitis in dairy animals: a review. *Pakistan*

*Veterinary Journal*, 26 (4), 204-208.

Kibebew, K. (2017). Bovine mastitis: A review of causes and epidemiological point of view.

*Journal of BiologyAgriculture and Healthcare*, 7(2), 1-14.

Ogola, H., Shitandi. A., &Nanua, J.(2007).Effect of mastitis onraw milk compositional

quality. *Journalof Veterinary Science*, 8(3), 237-242.

Oliveira, L., Hulland, C., & Ruegg, P. (2013). Characterization of clinical mastitis occurring in cows on 50 large dairy herds in Wisconsin. *Journal of Dairy Science,* 96(12), 7538-7549.

Oliver, S. P., Gillespie, B. E., Lewis, M. J., Ivey, S. J., Almeida, R. A., Luther, D. A., Johnson,

D. L., Lamar, K. C., Moorehead, H. D., & Dowlen, H. H. (2001). Efficacy of a new

premilking teat disinfectant containing a phenolic combination for the prevention of mastitis. *Journal of dairy science*, *84*(6), 1545–1549.

Petzer, I.M., Karzis, J., Donkin, E.F., Webb, E.C. & Etter, E. (2017). Somatic cell count

thresholds in composite and quar­ter milk samples as indicator of bovine intramammaryinfec­tionstatus.*Onderstepoort Journal of Veterinary Research* 84(1), 1-10.

Punniamurthy, N., Ramakrishnan, N., Nair, M.N.B., & Vijayaraghavan, S.(2017). *In-vitro*

antimicrobial activity of ethnoveterinary herbal preparation for mastitis. *Journal of Dairy &VeterinarySciences*, 3(2), ID.555607.

Rainard, P., Foucras, G., Boichard, D., & Rupp, R.(2018).Invited review: Low milk somatic

cell count and susceptibility tomastitis. *Journalof Dairy Science*, 101(8), 6703-6714.

Romero, J., Benavides, E., &Meza, C. (2018). Assessing financial impacts of subclinical

mastitis on Colombian dairy farms. *Frontiersin Veterinary Science*, 5, 273.

Sharma, N., Singh, N., & Bhadwal, M. (2011). Relationship of somatic cell count and mastitis: An overview. *Asian Australian Journalof Animal Sci*ences 24(3), 429-438.

Sharma, N., Mukherjee, R., & Mishra, A.(2014).Comparative evaluation of Aloe vera and glutaraldehyde teat antisepsison somatic cell count in an organized farm. *Indian*

*Veterinary Journal*,91(4), 40-41.

Sharma, R., Srivastava, A.K., Bacic, G.D., Jeong, K.,& Sharma, R.K. (2012). Epidemiology. In:

Bovine Mastitis. 1st ed. Delhi, India: Satish Serial Publishing House, 231-312.

Sudhan, N.A & Neelesh, S. (2010), “Mastitis-An Important Production Disease

of Dairy Animals”, *SMVS’ Dairy Year Book*, 72-88.

Waghmare, S.P., Kolte. A.Y., Ravikanth, K., & Thakur, A. (2013). Applications of herbal teat

dip mastidip liquid in sub-clinically mastitic animals and its role in further prevention of mastitis. *International Journal of Agricultural Sciences and Veterinary Medicine* 1 (4), 43-49.

Wicaksono, A., Sudarnika, E., Pisestyani, H., Sudarwanto, M., Zahid, A., Nugraha, A.B., Lubis,

M.P., &Patsiwi, I.P. (2019). Role of teat dipping after milking for sub-clinical mastitis control and improving production of dairy cow. *Buletin Peternakan*, 43(2), 135-140.

Woolford, M. (2001). Teat spray to halve mastitis. *Dairy Exporte*, 23.

Yanuartono, Y., Nururrozi, A., Indarjulianto, S., Purnamaningsih, H., &Ramandani, D.(2020).

The benefits of teat dipping asprevention of mastitis. *Journal of Livestock Science and Production,* 4(1), 231-249.

Zhao, X., Lacasse, P. (2008). Mammary tissue damage during bovine mastitis: causes and

control. *Journal of Animal Sci*ence, 86, 57-65.