



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SP4: 364-367

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(Special Issue- 4)
**International Conference on Food Security and
Sustainable Agriculture**
(Thailand on 21-24 December, 2018)

**Studies on therapeutic efficacy of poly herbal
formulation in management of sub clinical mastitis in
dairy cattle**

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Abstract

Sub clinical mastitis is a common problem of lactating cows. The higher the production potential, higher is the risk especially if the management is not proper. Antibiotic treatments of sub clinical mastitis are not recommended owing to public health concern. Herbs are safe and free from the menace of resistance. Polyherbal mix possess anti inflammatory, antibacterial, antioxidative, galactogogic and immunostimulatory properties, thereby open new vistas in mastitis therapy. The present study was therefore designed to study the therapeutic potential of polyherbal mix in management of mastitis. A phytogetic mixture was formulated using herbs having antimicrobial, anti inflammatory, immunostimulant and galactagocic properties and administered at two doses i.e. 100gm PO and 150 gm PO and compared with a standard antibiotic therapy. Poly herbal mix @ 150gm/animal daily had comparable therapeutic efficacy with standard antibiotic therapy but had better galactogocic properties. Both the groups had maximum efficacy of 83.33% as compare to 66.67% efficacy in group I. None of the animals in untreated control group showed recovery. Milk yield increased with 9.5% in comparison to an increase by 0.61% in antibiotic treated group.

Keywords: therapeutic efficacy, poly herbal, sub clinical mastitis, dairy cattle

Introduction

Mastitis is one of the most frequent infectious disease in dairy cattle and is a reason for heavy economic losses and antimicrobial drug uses in dairy cow (Minst *et al.*, 2012) [7]. Despite advancements, mastitis continues to rob the dairy industry in terms of decreased milk production, veterinary services, diagnostic, drugs, discarded milk, labour, decreased product quality, increase susceptibility to diseases, increased risk of culling and material for prevention (Hogeveen and osteras 2005) [4]. Of the two form of the mastitis, subclinical mastitis is subtle, causes huge economic losses and is difficult to detect as the cow appears healthy, the udder does not show any sign of inflammation and the milk appear normal, but milk production decreases by 10 to 20 % with undesirable effect on its constituents and nutritional value rendering it of low quality and unfit for processing (Holdway, 1992) [5]. Alternate medicine aims to boost animals' innate immunity to prevent the establishment of infection in udder. Nutrients supplements have been used with varying encouraging results. Herbs with immune stimulants properties or possessing galacto purifier, anti-inflammatory, antimicrobial properties can be exploited to keep this menace at bay. It will prove wonders if it possesses galactogenic effect too. Herbs been safe are definitely one of the best alternate to this problem as a polyhervbal mixed can suffice the needs as desired without any ill effect or public health concerned. The concept of cure under single roof can be made possible if a polyherbal preparation is formulated with such ingredients that their amalgamation not only increases milk production but also cures the subclinical mastitis.

The present study was therefore designed to study the therapeutic efficacy of polyherbal formulation in treatment of subclinical mastitis.

Materials and methods

The present study was conducted from November 2014 to April 2015 on 200 cross bred lactating cows. The cross breds were the crosses of Holstein freisian and were housed, fed and managed under identical manage mental conditions.

Milk samples were aseptically collected from each quarter before and after the therapy. The udder was initially washed with antiseptic solution for visible debris and teat ends were scrubbed with soft cotton soaked in 70% ethanol and allowed to air dry. The first 3-4 streak of milk was discarded and next 10 ml milk was collected in two separate clean, dry and sterilized test tubes. The tubes were stopped and brought immediately to the laboratory in ice packed container for mastitis screening test namely California mastitis test, white side test and somatic cell count.

Twenty four animal showing positive tests for subclinical mastitis were given dietary supplementation with various doses of polyherbal mixture (PHM) formulated at the college, containing *Withania Somnifera*, *leptadenia reticulate*, *Bunium bulbocastanum*, *Tinospora cordifolia* and *Trigonella Foenum-Graecum*. The entire cows were randomly divided in to four different groups containing six animals in each group. Each animal of group I were given polyherbal mixture at the dose rate 100 gm (PHM-100) for 15 days. Cows of group II were supplemented with polyherbal mixture at the dose rate of 150 gm (PHM – 150) for 15 days. Cows in group III were supplemented with standards antibiotic treatment that is Ceftizoxime @ 2.5 gm single dose, 6 animals were kept as control and fed normal diet without any supplementation (Group IV).

Statistical analysis was done using t-test as described by Snedecor and Cochran (1994).

Result and Discussion

The efficacy of poly herbal mix was adjudged based on changes in blood and milk profile and comparing the pre and post therapy mastitis screening test indices.

Group I

Animal in group I (PHM, 100) supplemented with poly herbal mix @ 100gm PO for 15 days showed 66.67% recovery. The mean CMT score of 2.15 ± 0.28 on day 0 decreased significantly to 1.06 ± 0.15 after treatment. The mean WST and MST score point decreased insignificantly from 1.93 ± 0.316 and 1.74 ± 0.51 to 1.09 ± 0.246 and 0.83 ± 0.17 respectively. A similar trend was noticed in SCC also as 0 days count decreased significantly from 6.42 ± 0.89 ($\times 10^6$) to 3.24 ± 0.42 ($\times 10^6$) after the treatment.

Serum profiles

The levels of total proteins and albumin showed significant increase from 8.92 ± 0.86 and 2.96 ± 0.36 to 10.06 ± 0.66 and 3.68 ± 0.36 respectively after therapy. The level of globulin increased from 5.85 ± 0.154 to 6.26 ± 0.545 after therapy non significantly. The ratio of albumin and globulin increased non significantly from 0.50 ± 0.118 to 0.58 ± 0.116 after the treatment. A nonsignificant increase was observed in calcium level (gm/dl) from 7.09 ± 1.71 to 8.69 ± 1.40 after treatment. The level of phosphorous (gm/dl) increased from 6.26 ± 0.35 to 6.64 ± 0.35 . (Table 3)

Hematology

The hemoglobin level increased from 8.11 ± 0.27 gm/dl to 8.36 ± 0.38 gm/dl. A significant increase in PCV was observed from 25.43 ± 2.06 to $28.63 \pm 1.54\%$. A significant decrease in

leukocyte count was also recorded. It decreased from 10.82 ± 0.65 to 8.36 ± 0.80 . Post therapy a decline was recorded in neutrophils (%) lymphocytes (%) and eosinophils Count (%) from 43.38 ± 2.42 to 42.12 ± 1.14 ; 55.63 ± 1.45 to 53.51 ± 1.43 and 1.28 ± 0.26 to 1.04 ± 0.24 respectively (Table 4).

Milk Profile

An increase in milk yield (its) by 6.87% from 8.73 ± 0.78 to 9.33 ± 1.06 was recorded. A non significantly increase in fat % from 4.23 ± 0.48 to 4.33 ± 0.54 was noticed. Similar increase was observed in SNF% and total solid (%) also (Table 5 and 6).

Group II

In group II, 6 animals received supplementation of poly herbal mix @ 150 gm PO OD for 15 days out of which 83.33% (5 animals) recovered completely (Table 1). A significant declining trend was recorded in the mean CMT score point (2.20 ± 0.11 to 0.85 ± 0.13), WST score point (1.81 ± 0.587 to 0.93 ± 0.132) and MST point (1.62 ± 0.45 to 1.03 ± 0.316). The somatic cell count decrease significantly from 5.89 ± 0.98 to 1.95 ± 0.86 after the therapy (Table 2).

Serum Profile

The level of total protein (gm/dl) and albumin (gm/dl) increase from 9.18 ± 0.576 and 3.02 ± 0.442 to 10.16 ± 0.576 and 4.14 ± 0.050 respectively. A noninsignificant increase in globulin from 6.16 ± 0.64 to 6.46 ± 0.63 was also observed. The level of albumin and globulin (gm/dl) ratio increased nonsignificantly from 0.49 ± 0.016 before treatment to 0.64 ± 0.093 after treatment. The level of calcium and phosphorus increase from 7.31 ± 1.214 to 8.74 ± 1.27 and 6.84 ± 0.93 to 7.10 ± 0.39 . The increase in calcium level was statistically significant.

Haematology

Post supplementation at 150 gm/day dose, a significant increase in hemoglobin level (gm/dl) was noticed from 9.72 ± 0.69 to 10.81 ± 0.64 . A non significant increase in PCV (%) and TEC ($\times 10^6/\mu\text{l}$) from 30.36 ± 1.03 to 31.81 ± 0.74 and 4.81 ± 0.60 to 5.34 ± 0.37 was noticed post therapy. A significant decrease in TLC ($\times 10^3/\mu\text{l}$) from 14.57 ± 1.28 to 10.68 ± 0.86 was also observed. Neutrophils, Lymphocyte, eosinophils and monocytes count also declined in post therapy (Table 4).

Milk profile

The average milk yield before therapy was 7.76 ± 0.94 and increased by 9.5% post therapy to 8.50 ± 1.06 . It's an increase in fat (%). SNF (%) and total solid (%) was also recorded although the increase was statistically non significant (table 5 and 6).

Group III

Out of 6 animals of group III administered by injection Ceftizoxin (Provimi animal health care) five animals (83.33%) showed complete recovery after single shot whereas remaining 16.67% animals remained in subclinical mastitis state (Table 1).

The mean CMT score of 2.17 ± 0.527 on 0 day decrease significantly to 1.67 ± 0.516 . The mean WST and MST score point decreased nonsignificantly from 1.81 ± 0.647 and 1.47 ± 0.416 to 1.16 ± 0.547 and 0.83 ± 0.316 respectively. A similar reduction was noticed in SCC also, with pretreatment values declining significant from $6.15 \times 10^5 \pm 0.86$ to

$1.99 \times 10^5 \pm 0.41$ (Table 2).

Serum profiles

The level of total protein (gm/dl) and albumin (gm/dl) increased from 9.42 ± 0.76 and 3.28 ± 0.275 to 9.86 ± 0.86 and 4.26 ± 0.275 , respectively, after the treatment. The increase was however statistically nonsignificant. The level of globulin decreased nonsignificantly from 6.12 ± 0.84 to 4.89 ± 0.62 . The level of albumin and globulin ratio increased from 0.52 ± 0.12 before treatment to 0.87 ± 0.128 after the treatment (Table 3). A significant increase in the level of calcium was observed from 7.16 ± 0.701 to 8.37 ± 1.08 after the treatment. The phosphorus level increased nonsignificantly from 6.96 ± 0.541 to 7.5 ± 0.541 (Table 3).

Hematology

Unlike the poly herbal supplementation group, the hemoglobin level (gm/dl) decline post therapy in antibiotic treated group from 8.9 ± 0.73 to 8.31 ± 0.71 . The decline was however statistically non significant. The PCV count was almost similar pre and post therapy. A significant decrease in leukocyte count from 12.18 ± 0.91 to 9.74 ± 0.63 and neutrophil count from 45.79 ± 1.48 to 36.01 ± 1.21 was observed. The reduction was observed in lymphocyte, eosinophil, monocyte was nonsignificant statistically (Table 4).

Milk profile

The milk yield did not change after the therapy with just a slight increase by 0.61% (Table 5 and 6).

Group IV

All the animals of unsupplemented control group remained in sub clinical state with no recovery (Table 1).

The somatic cell count increased although statistically non significant from 6.24 ± 1.04 ($\times 10^5$ cell/ml) to 6.86 ± 1.28 ($\times 10^5$ cell/ml). A similar trend in CMT score, MST score and WST score was also observed (Table 2). A decline in total proteins, albumin and an increase in globulin was noticed, No change in calcium or phosphorus level was observed (Table 3).

Table 1: Therapeutic efficacy of poly herbal mix supplementation in cows having sub clinical mastitis.

Group	Total number of animals	Post supplementation status of cows	
		Recovered	Unrecovered
			Sub clinically mastitis
I	6	4 (66.67%)	2/6
II	6	5 (83.33%)	1/6
III	6	5 (83.33%)	1/6
IV	6	-	6/6

Table 2: Screening test profile before and after supplementation. $P \leq 0.05$

Group	CMT		WST		MST		SCC $\times 10^6$ cells/ml	
	Before treatment	After treatment	Before	After	Before	After	Before	After
I	2.15 ± 0.28	1.06 ± 0.15	1.93 ± 0.316	1.09 ± 0.246	1.74 ± 0.51	$.83 \pm 0.17$	6.42 ± 0.89	3.24 ± 0.42
II	2.20 ± 0.11	0.85 ± 0.13	1.81 ± 0.58	0.93 ± 0.13	1.62 ± 0.45	1.03 ± 0.31	5.89 ± 0.98	1.95 ± 0.86
III	2.17 ± 0.527	1.17 ± 0.516	1.81 ± 0.64	1.16 ± 0.54	1.47 ± 0.41	0.831 ± 0.03	6.15 ± 0.86	1.99 ± 0.41
IV	2.21 ± 0.81	2.32 ± 0.48	2.12 ± 0.84	2.31 ± 0.82	1.96 ± 0.58	2.12 ± 0.49	6.24 ± 1.04	6.86 ± 1

Table 3: $P \leq 0.05$, Serum profile before and after supplementation.

	Group I		Group II		Group III		Group IV	
	Treatment Before	After	Before	After	Before	After	Before	After
Total protein (gm/dl)	8.92 ± 0.86	10.06 ± 0.66	9.18 ± 0.57	10.16 ± 0.57	9.42 ± 0.76	9.86 ± 0.86	9.27 ± 0.62	9.13 ± 0.47
Albumin (gm/dl)	2.96 ± 0.36	3.68 ± 0.36	3.02 ± 0.44	4.14 ± 0.05	3.28 ± 0.27	4.26 ± 0.27	3.46 ± 0.52	3.32 ± 0.43
Globulin (gm/dl)	5.85 ± 0.154	6.26 ± 0.45	6.12 ± 0.64	6.46 ± 0.63	6.12 ± 0.84	4.89 ± 0.64	5.28 ± 0.71	5.86 ± 0.84
Albumin:globulin	0.50 ± 0.11	0.58 ± 0.12	0.49 ± 0.01	0.64 ± 0.09	0.52 ± 0.12	0.87 ± 0.12	0.65 ± 0.03	0.58 ± 0.36
Calcium (gm/dl)	7.09 ± 1.7	8.69 ± 1.4	7.31 ± 1.21	8.74 ± 1.27	7.16 ± 0.74	8.37 ± 1.08	7.46 ± 1.45	7.52 ± 0.24
Phosphorus (gm/dl)	6.26 ± 0.35	6.64 ± 0.35	6.84 ± 0.93	7.10 ± 0.39	6.96 ± 0.54	7.5 ± 0.541	7.08 ± 0.32	7.86 ± 0.68

Hematology:

No significant change in complete blood count was noticed in

control group except an increase in neutrophils count and total leukocytes count (Table 4).

Table 4: Mean \pm SE of pre and post treatment values of haematology.

		GROUP I	GROUP II	GROUP III	GROUP IV
		MEAN \pm SE	MEAN \pm SE	MEAN \pm SE	MEAN \pm SE
HB (gm/dl)	Pre treatment	8.11 ± 0.27	9.72 ± 0.69	8.98 ± 0.75	9.21 ± 0.33
	Post treatment	8.36 ± 0.38	10.81 ± 0.64	8.31 ± 0.71	9.1 ± 0.33
PCV (%)	Pre treatment	25.43 ± 2.06	30.36 ± 1.03	27.56 ± 0.13	29.63 ± 1.01
	Post treatment	28.63 ± 1.54	31.81 ± 0.74	27.50 ± 0.72	26.95 ± 0.67
TEC $\times 10^6/\mu\text{l}$	Pre treatment	4.93 ± 0.23	4.81 ± 0.60	5.45 ± 0.34	7.12 ± 0.20
	Post treatment	5.11 ± 0.24	5.34 ± 0.37	5.34 ± 0.27	6.91 ± 0.17
TLC $\times 10^3/\mu\text{l}$	Pre treatment	10.82 ± 0.65	14.57 ± 1.28	12.18 ± 0.01	8.55 ± 0.30
	Post treatment	8.36 ± 0.80	10.68 ± 0.86	9.74 ± 0.63	9.39 ± 0.33
N (%)	Pre treatment	43.38 ± 2.42	47.31 ± 2.52	45.79 ± 1.48	42.08 ± 1.38
	Post treatment	42.12 ± 1.14	41.82 ± 1.34	36.01 ± 1.81	44.82 ± 1.49
L (%)	Pre treatment	55.63 ± 1.45	58.38 ± 1.45	51.51 ± 1.51	52.63 ± 1.22
	Post treatment	53.51 ± 1.43	57.41 ± 1.34	51.18 ± 1.63	50.25 ± 1.47
E (%)	Pre treatment	1.28 ± 0.26	2.94 ± 0.95	1.32 ± 0.34	2.06 ± 0.12
	Post treatment	1.04 ± 0.24	1.35 ± 0.39	1.18 ± 0.23	2.17 ± 0.45
M (%)	Pre treatment	1.19 ± 0.21	2.34 ± 0.17	1.48 ± 0.10	2.44 ± 0.18
	Post treatment	2.70 ± 0.25	2.16 ± 0.34	1.21 ± 0.13	2.28 ± 0.13

Milk profile

A gradual decrease in milk yield from 9.83 ± 1.27 to 8.4 ± 1.46 was observed. Fall in fat percentage, SNF percentage and total

solids was observed as there was no recovery and all the animals remained in sub clinical mastitis (Table 5 and 6).

Table 5: Milk yield (Lt.) before and after treatment in sub clinical mastitis positive cows. $P \leq 0.05$

Days	Group-I PHM (100gm)	Group-II PHM (150gm)	Group-III	Group-IV Control
0 day	8.73 ± 0.78	7.76 ± 0.94	8.25 ± 1.13	9.83 ± 1.76
5 th day	9.47 ± 0.63	8.33 ± 0.66	8.0 ± 1.27	9.40 ± 1.54
10 th day	9.33 ± 0.82	8.27 ± 0.97	8.14 ± 1.46	9.1 ± 1.23
15 th day	9.33 ± 1.06	8.50 ± 1.06	8.36 ± 1.12	8.4 ± 1.42
% variation	Increase (6.87%)	Increase (9.5%)	Increase (0.61%)	Decrease (14.54%)

Table 6: Milk parameters before and after treatment in sub clinical mastitis positive cows.

	Group-I PHM (100mg)		Group-II PHM (150mg)		Group-III		Group-IV Control	
	Before	After	Before	After	Before	After	Before	After
Fat (%)	4.23	4.33	4.46	4.80	4.70	5.50	4.63	4.10
SNF (%)	7.93	8.06	8.06	8.13	8.00	7.40	8.13	7.63
Total solids (%)	12.38	11.92	12.12	12.86	12.76	12.88	12.76	11.73

Conclusion

The present studies clearly indicate that poly herbal mix effectively reduced the somatic cell count comparable to standard antibiotic therapy. A reduction in the somatic cell count in groups showing recovery is due to the reduction in infection level. Somatic cells are the leukocytes that infiltrate into the mammary gland to challenge the invading pathogens, as a part of cellular defense mechanism of the host. Thus higher level of SSC in milk is a bio- indicator of udder infection (de Haas *et al.*, 2002). Behera *et al.* (2013) [2] also reported beneficial effect of herbs in subclinical mastitis and agalactia and were of view that they increase the level of immunoglobulin and decrease total leucocytes count. They attributed to the change in rumen ecosystem. Significant decrease in SSC in the milk of herbal formulation supplementation group over control is a reflection of its immunomodulatory anti microbial activity of the component herbs. In the present study in sub clinically affected cows the increase in milk yield was observed in both the herbs supplemented groups after cessation of therapy. Similar to our findings, kolte *et al.* (2008) [6] reported that indigenous herbal preparations effectively restored the altered milk constituents and increased the milk production in cows with sub- clinical mastitis. Sridhar and Bhagwat (2007) [9] also reported significant improvement in haemoglobin, serum calcium and total protein level after treatment of Galactin Vet® with 5.48% increased milk yield which indicate the good health of animals. Patel *et al.* (2013) [8], Baig and Bhagawat (2009) [1] also recorded a higher Fat %, SNF and lactose in poly herbal supplementation than that of control group. Also according to Sandholm (1995), treatment of subclinical mastitis during lactation is not indicated, unless a very high infection rate endangers the marketing of milk. The cost therapy and milk discarded during the withdrawal period seriously reduces the benefit of therapy. Pharmacokinetic limitations of antibiotics such as absorption, disposition, and elimination, sequestration due to ionization, diffusion barriers and intracellular parasitism (*S. aureus*) too may prevent antimicrobials from reaching the site of infection in adequate concentrations. Moreover the usage of antibiotics during lactation increases the risk of residues in milk and dairy products and there are global concerns for the development of antimicrobial drug resistance.

References

- Baig MI, Bhagawat VG. Study the efficacy of Galactin Vet Bolus on milk yield in dairy cows. Veterinary world. 2009; 2(4):140-142.
- Behera PC, Tripathy DP, Parija SC. Shatavari: Potentials for galactagogue in dairy cows. Indian j. Tradit. Know. 2013; 12(1):9-17.
- De Hass Y *et al.* The effect of pathogen- specific clinical mastitis on the lactation curve and somatic cell count. Journal of dairy science. 2002; 85(5):1314-1323.
- Hogeveen H, Osteras O. Mastitis management in an economic framework. In: HogeveenH (ed). 4th IDF international Mastitis conference 2005, 41-52.
- Holdway RJ. Bovine mastitis in New Zealand dairy herds. Part III. The cost of mastitis to the New Zealand dairy farmers during the 1991/1992 dairy season. Published report to the livestock improvement corporation, Hamilton, 1992.
- Kolte AY, Waghmare SP, Mode SG, Handa A. Efficacy of indigenous herbal preparation on altered milk pH, somatic cell count and electrolyte profile in subclinical mastitis in cows. Vet. World. 2008; I(8):239-240.
- Minst K, Martlbauer E, Miller T, Meyer C. *Streptococcus spp* isolated from mastitis milk sample in Germany and their resistance to antimicrobial agents. J dairy. Sci. 2012; 12:6957-6. 962.
- Patel MD, Tyagi KK, Sorathiya LM, Fulsoundar AB. Effect of polyherbal galactagogue supplementation on milk yield and quality as well as general health of Surti buffaloes of south Gujarat. Vet world. 2013; 6(4):214-218.
- Sridhar NB, Bhagwat VG. Study to assess the efficacy and safty of Galactin Vet bolus in lactating dairy cows, Mysore journal of Agricultural sciences. 2007; 41(40):496-502.