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Study on haematological parameters of mite infested cattle treated with polyherbal acaricidal formulations

Kuldeep Kumar, AP Singh and Jayesh Vyas

Abstract
In this study, two polyherbal formulations namely polyherbal formulation-A (PHF-A) and polyherbal formulation-B (PHF-B) which are prepared by Centre for Ethno-veterinary Practice and Alternative Medicine (CEVPAM), RAJUVAS, Bikaner, were used to evaluate effect of these formulations on haematological parameters of mite infested cattle. Haematological estimation in mite infested cattle revealed significant decrease in Hb, PCV, TEC and neutrophils and significant increase in TLC, lymphocyte and eosinophil as compared to healthy control cattle. However, monocytes count, mean corpuscular volume**,** mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration estimation revealed non-significant variation in mite infested cattle as compared to healthy control cattle. Post-treatment haematological parameters revealed that as similar to benzyl benzoate, PHF-A and PHF-B are also very effective to normalize the haematological parameters in mite infested cattle and these polyherbal can be used as best alternative of synthetic acaricides against mite infestation in cattle.

Keywords: Cattle, mite infestation, haematology, herbal acaricides

Introduction
Livestock in general and dairying in particular play a vital role in economy of our country and also in the socio-economic development of millions of the rural households (Vision-2022: NAPDD, 2018) [28]. The overall contribution of livestock sector in total GVA of our country is nearly 4.19 per cent at current prices during 2018-19. Ectoparasites and ectoparasites borne diseases to animals are major problem in development of socio-economic condition of farmers as they are related to ill health, reduced milk production, low graded milk, disease transmission, veterinary expenses and death of animals. Skin diseases mainly related to mite infestation cause mortality, decreased production and reproduction; in addition to these, currently skin diseases affecting the tanning industry very seriously causing enormous down grading and rejection of skin and hides (Bayou, 1998; Yacob, 2013) [9, 29].
Livestock rearing in rural and tribal areas is quite different than urban areas due to their economic status, at the same time to keep their animals healthy, traditional healing practices have been applied for centuries and passed down orally from generation to generation (Balaji and Chakravarthi, 2010; Kaur *et al*., 2015) [6, 13]. Before the introduction of western medicine, all livestock keepers relied on these traditional practices. This method serves better as alternative to synthetic and modern concept of treatments (Pandey *et al*., 2007) [21]. Since, synthetic acaricides are expensive and can be detrimental to the environment: their use should be minimized and integrated with alternative approaches (Minjauw and Castro, 1999) [19].
In perspective, the present study was aimed to gather information about the effect of tick burden on cattle haematology and response of haematological parameters in respect to polyherbal acaricidal treatment.

Materials and Methods
In this study, two polyherbal formulations namely polyherbal formulation-A (PHF-A) and polyherbal formulation-B (PHF-B) which are prepared by centre for ethno-veterinary practice and alternative medicine (CEVPAM), RAJUVAS, Bikaner, were used to evaluate effect of these formulations on haematological parameters of mite infested cattle. For this trial, 32 mite infested and 8 apparently healthy cattle were included. mite infested cattle were randomly categorized in four groups (group I, group II, group III and group IV) comprising 8 cattle in each group. Cattle of group I and group II were sprayed with PHF-A and PHF-B, respectively, five applications with the interval of 24 hours. To compare the acaricidal efficacy of polyherbal formulations group III were treated with three topical applications of 25 per cent

benzyl benzoate with the interval of 24 hours as positive control and group IV was left untreated as negative control. Apparently healthy cattle were used as positive control group for comparison of haematological parameters.

For haematological parameters estimation, blood samples from mite infested cattle were collected on day 0 as pre-treatment and on day 15th as post-treatment from jugular vein in EDTA containing vacutainers and were analysed by using standard methods of Feldman *et al.* (2000) [10].

Results and Discussion

The pre-treatment (0 day) and post-treatment (15th day) mean±SE values of haematological parameters of apparently healthy control cattle and mite infested cattle (group III, group IV, group V and group VI) are presented in Table 1.

The statistical data analysis of pre-treatment (0 day) mean±SE values of haemoglobin (gm/dl), packed cell volume (%) and total erythrocyte count (×10^6/µl) revealed significant (p<0.05) decrease in all groups of mite infested cattle as compared to apparently healthy control cattle. Post-treatment (15th day) Hb, PCV and TEC values increase highly significant (p<0.01) in all treated groups of mite infested cattle as compare to day 0 of corresponding group and found as similar to healthy control. In untreated group (G IV) of mite infested cattle Hb, PCV and TEC values decrease significantly on day 15th as compare to day 0 of corresponding group. In apparently healthy control group Hb, PCV and TEC values of day 0 and day 15th differ non-significantly. The reduction in the Hb, PCV and TEC in mite infested as compare to apparently healthy control cattle may be due to blood sucking by mites and injury to the host by their bites leads to haemorrhage.

The reduction in the Hb, PCV and TEC in mite infested cattle might be due to blood sucking by these ectoparasites and injury to the host by their bites leads to haemorrhage. Jain (1986) [12] and Pas'Ko and Chotchaev (1974) [22] reported that lower haemoglobin count in mite infested cattle might be due to significantly lowered erythrocyte indices, hematocrit and increased erythrocyte fragility or due to toxemia caused by mites. In agreement to current study Gorakhmal *et al*. (2000) [11], Anju and Rath (2006) [4], Mathur (2004) [18] and Sinha *et al.* (2004) [26] also recorded reduced Hb, PCV and TEC in sarcoptic mange affected cattle, buffalo calves, camels and pigs as compare to healthy control, respectively. Aatish *et al.* (2007) [1] reported significantly lower packed cell volume in mite infested sheep due to significantly low erythrocyte counts.

In mite infested cattle, pre-treatment (0 day) mean±SE total leucocytes count (×10^3/µl), lymphocyte count (%) and eosinophils count (%) were found significantly (p<0.05) increase whereas neutrophils and platelets count were found significantly (p<0.05) decrease in all groups of mite infested cattle as compared to apparently healthy control cattle. Post-treatment (15th day) TLC, lymphocytes, eosinophils, neutrophils and platelets count were found as similar to apparently healthy control cattle. In untreated group of mite infested cattle TLC, lymphocytes and eosinophils count increase significantly (p<0.05) and neutrophils and platelets count decrease significantly (p<0.05) on day 15th as compare to day 0 of corresponding group.

Table 1: Pre-treatment (0 day) and post-treatment (15th day) mean±SE haematological values of apparently healthy control and mite infested cattle

Parameters	Groups	0 Day	15th Day	Significance level	Parameters	0 Day	15th Day	Significance level
Hb (g/dl)	Healthy	11.74±0.24	11.70±0.21	NS	Monocytes (%)	2.87±0.33	2.33±0.33	NS
	Group I	9.47±0.24	11.76±0.23	**		2.54±0.37	2.71±0.46	NS
	Group II	9.64±0.31	11.87±0.39	**		2.03±0.23	2.61±0.37	NS
	Group III	9.33±0.22	11.91±0.29	**		2.25±0.26	2.21±0.32	NS
	Group IV	10.01±0.24	9.31±0.25	*		2.25±0.26	2.33±0.33	NS
PCV (%)	Healthy	35.06±0.67	35.15±0.59	NS	Eosinophils (%)	4.73±0.44	4.98±0.44	NS
	Group I	28.14±0.90	34.52±0.47	**		8.35±1.37	4.38±0.67	**
	Group II	29±0.98	35.20±0.76	**		9.07±1.27	4.84±0.46	**
	Group III	27.10±0.94	35.39±0.68	**		9.37±1.31	4.54±0.32	**
	Group IV	29.10±0.54	26.85±0.91	*		8.07±0.65	11.12±0.91	*
TEC (×10^6/µl)	Healthy	7.59±0.33	7.46±0.28	NS	MCV (fl)	46.20±1.38	47.10±2.46	NS
	Group I	6.01±0.22	7.61±0.16	**		46.83±2.55	45.33±1.22	NS
	Group II	6.18±0.19	7.63±0.25	**		46.93±0.81	46.12±1.88	NS
	Group III	5.74±0.29	7.72±0.31	**		47.24±1.60	45.84±2.06	NS
	Group IV	6.25±0.20	5.77±0.22	*		46.55±1.82	46.52±1.49	NS
TLC (×10^3/µl)	Healthy	8.22±0.50	8.36±0.46	NS	MCH (pg)	15.46±0.38	15.68±0.61	NS
	Group I	19.41±1.45	8.46±0.30	**		15.75±0.73	14.72±0.41	NS
	Group II	20.27±2.08	8.41±0.39	**		15.60±0.30	15.55±0.74	NS
	Group III	20.68±0.80	7.96±0.25	**		16.27±0.64	15.43±0.86	NS
	Group IV	18.52±1.11	23.51±0.93	**		16.0±0.58	16.13±0.53	NS
Neutrophil (%)	Healthy	32.71±1.94	33.57±1.31	NS	MCHC (g/dl)	33.50±0.32	33.28±0.90	NS
	Group I	22.89±0.85	33.16±0.90	**		33.64±0.46	32.47±0.36	NS
	Group II	21.08±1.34	33.44±0.73	**		33.25±0.31	33.71±0.49	NS
	Group III	20.57±1.33	34.25±1.08	**		34.43±0.70	33.66±0.37	NS
	Group IV	22.52±0.80	18.43±1.02	**		34.38±0.35	34.68±0.52	NS
Lymphocyte (%)	Healthy	58.37±2.07	57.96 ±1.67	NS	Platelets (×10^5/µl)	4.55±0.23	4.65±0.22	NS
	Group I	65.04±1.20	57.79±1.19	**		3.14±0.19	4.46±0.23	**
	Group II	66.91±1.28	57.66±1.21	**		3.41±0.29	4.49±0.19	**
	Group III	66.37±1.64b	58.42±1.12	**		3.88±0.17	4.68±0.10	**
	Group IV	66.16±1.28	68.41±1.35	NS		3.32±0.17	2.91±0.21	*

**=p<0.01, *=p<0.05, NS=Non-significant

As compare to apparently healthy cattle, higher total leucocyte count in mite infested cattle may be in response to inflammation caused by ectoparasite bites. As similar to this study, Mahran *et al*. (2004) [17], Anju and Rath (2006) [4], Bala and Rath (2006) [7], Vishe *et al.* (2012) [27] and Abdel-Saeed (2020) [20] reported increased total leucocyte count in different species of animals infested with sarcoptic mange in their respective study. However, a significant decrease in total leucocyte count in ectoparasitic infestation has also been reported by some researchers in their respective studies (Ahmad *et al.*, 2006; Sharma, 1979) [3, 25].

Among differential leucocytes count, lower neutrophils count in mite infested cattle might be due to inflammation caused by ectoparasites bite which leads to migration of white blood cells as a response toward the bite. Present study also gain support with findings of Vishe *et al*. (2012) [27] and Sarma *et al.* (2019) [24] who reported significantly lower neutrophils count in mite infested Surti buffaloes and pigs, respectively. However, increased neutrophils count has also been reported in ectoparasitic infestation in different animal species by some researchers in their respective study (Abdel-Saeed, 2020 and Aziz *et al*., 2020) [20, 5]. Higher lymphocytes count in mite infested cattle may be due to activation of immune system. Present study gain support with findings of Vishe *et al*. (2012) [27] and Aziz *et al*. (2020 who reported significantly higher lymphocytes count in mite infested Surti buffaloes and camels, respectively in their respective study. However, Abdel-Saeed (2020) [20] reported lower lymphocytes count in sarcoptic mange affected cattle. Higher eosinophils in mite infested cattle might be associated with ongoing allergic reactions to mites or their metabolic products. Present study gains support with findings of Vishe *et al*. (2012) [27], Aatish *et al*. (2007) [1] and Mourad *et al*. (1987) [20] who reported significantly higher eosinophils count in mite infested Surti buffaloes, sheep and cattle as compare to healthy control, respectively. Abdel-Saeed (2020) [20] and Aziz *et al*. (2020) [5] reported increased eosinophils count in sarcoptic mange affected camel as compare to healthy control.

Lower platelets in mite infested cattle might be associated with chronic blood loss. Similar to current study, Vishe *et al.* (2012) [27] reported decreased platelets count in mite infested buffaloes as compared to healthy control. However, increased platelets count has also been reported by some workers in ectoparasitic infested cattle than healthy cattle (Kaur *et al*. 2017) [14].

However, the statistical data analysis of pre-treatment (0 day) and post-treatment (15th day) mean±SE monocytes count, mean corpuscular volume (MCV, fl)**,** mean corpuscular haemoglobin (MCH, pg) and mean corpuscular haemoglobin concentration (MCHC, g/dl) revealed non-significant variation in all groups of mite infested cattle as compared to apparently healthy control cattle. In healthy control group all haematological parameters of day 0 and day 15th differ non-significantly.

Non-significant difference in MCV, MCH and MCHC in mite infested cattle as compare to apparently healthy control cattle may be attributed to the normocytic normochromic anaemia in infested cattle. Anaemia is classified as normocytic when erythrocytes that have a normal size or volume (normal MCV); macrocytic, when the MCV is high; microcytic, when the MCV is low; normochromic, when erythrocytes containing the normal amount of haemoglobin (normal MCHC), hypochromic, when the MCHC is abnormally low; and hyperchromic, when the MCHC is abnormally high (Pfaffle *et al*., 2009) [23].

Finding of present study are in agreement with Kaur *et al*. (2017) [14] and Khalaf *et al*. (2020) [15] who have reported no significant difference in MCV, MCH and MCHC of ectoparasitic infested cattle and healthy cattle. Kumar *et al*. (2010) [16] and Barznji *et al*. (2014) [8] reported non-significant difference in mean corpuscular volume in mite infested goats and sheep as compared to healthy control, respectively. However, significantly lower MCH in ectoparasitic infested cattle than healthy cattle were also observed in previous study (Khalaf *et al.*, 2020) [15].

Conclusion

The results of current study indicate that there was significant alteration of haematological parameters due to effect of mite burden on cattle as compare to heathy control cattle. Post-treatment haematological parameters revealed that as similar to benzyl benzoate, PHF-A and PHF-B are also very effective to normalize the haematological parameters in mite infested cattle. Since, synthetic acaricides (like benzyl benzoate) are expensive and can be detrimental to the environment, their use should be minimized and integrated with alternative approaches. Thus, one such method is the utilization of eco-friendly, safe, effective and economical indigenous plant extracts or plant-derived products based therapy called as herbal acaricide. Looking towards such importance of herbal acaricides, PHF-A and PHF-B can be used as best alternative of synthetic acaricides against mite infestation in cattle

References

1. Aatish H, Sindhu Z, Iqbal Z, Jabbar A, Tasawar Z. Prevalence of Sheep Mange in District Dera Ghazi Khan (Pakistan) and Associated Hematological/Biochemical Disturbances. International Journal of Agriculture & Biology. 2007;9(6):917-920.
2. Abdel-Saeed H. Clinical, Hematobiochemical and Trace-Elements Alterations in Camels with Sarcoptic Mange (*Sarcoptes scabiei* Var *cameli*) Accompanied by Secondary Pyoderma. Journal of Applied Veterinary Sciences. 2020;5(3):1-5.
3. Ahmad N, Hashmi HA, Khan SA. Study on ticks and haemoparasitic diseases of local cattle in Malakand agency. Journal of Animal and Plant Science. 2006;16(3):82-84.
4. Anju-Bala, Rath SS. Studies on haemato-biochemical alterations due to sarcoptic mange in buffalo calves. Indian Veterinary Journal. 2006;83(2):230-231.
5. Aziz PR, Marodia S, Ganesan PI, Sharma CS. Hemato-Biochemical and Therapeutic Trials on Sarcoptic Mange in Camels. International Journal of Current Microbiology and Applied Sciences. 2020;9(3):2906-2913.
6. Balaji N, Chakravarthi R. Ethnoveterinary Practices in India: A Review. Veterinary World. 2010;3(12):549-551.
7. Bala A, Rath SS. Studies on haemato- biochemical alterations due to Sarcoptic mange in buffalo calves. Indian Veterinary Journal. 2006;83(2):230-231.
8. Barznji AA, Abdullah SH, Kadir MA. Evaluation of Haematological parameters in sheep infested with ticks in Sulaimani region. Journal of Kirkuk University for Agricultural Sciences. 2014;5(2):1-7.
9. Bayou K. Control of Sheep and Goat Skin Diseases. In: Proceedings of Control of Sheep and Goat Skin Diseases for Improved Quality of Hides and Skin. FAO, 1998; Addis Ababa.

10. Feldman BF, Zinke JG, Jain NC. Schalm's Veterinary Haematology, Lippincott Williams and Wilkins, 5th edition. 2000, 1344-1348.
11. Gorakhmal Sena DS, Kumar R, Sahani MS. A study on the clinical, haemato-biochemical and histopathlogical aspect of mange in camels. Journal of Veterinary Parasitology. 2000;14:27-30.
12. Jain NC. Schalm's Veterinary Hematology, 4th Edn. Lea & Febiger Philadelphia. 1986, 36-64.
13. Kaur D, Jaiswal K, Mishra S. Ethnoveterinary Practices in India: A Review. European Journal of Pharmaceutical and Medical Research. 2015;2(7):139-143.
14. Kaur D, Jaiswal K, Mishra S. Effect of tick infestation on haematological parameters of calves. Journal of Entomology and Zoology Studies. 2017;5(4):107-111.
15. Khalaf TM, Hasan TAH, Mustafa HA. Study of effects the outer insects as parasites on some of hematological changes of cattle in Nanava city. Systemic Reviews in Pharmacy. 2020;11(12):1345-1349.
16. Kumar A, Vihan VS, Sadhana, Sharma HN. Haematological and Biochemical Effects of Tick Infestation in Common Indian Goat. Advances in Bioresearch. 2010;1(1):163-168.
17. Mahran OM, Saleh MA. Prevalence of ectoparasites and their effect on some biochemical indices in camels (*Camelus dromedarius*) at Shalatin city. Assiut Veterinary Medical Journal. 2004;50(100):164-187.
18. Mathur M. Pathological and haemato-biochemical studies of skin lesions in camel (*Camelus dromedarius*), 2004. Ph.D. thesis submitted to R.A.U. Bikaner.
19. Minjauw B, DeCastro JJ. Host resistance to ticks and tick-borne disease: its role in integrated control. 2nd ed., Breeding for Disease Resistance in Farm Animals. Wallingford, UK, 1999, 153-170.
20. Mourad LM, Karram MH, Abdel-All TS, Abdel Salam FA. Clinical and some blood constituent studies on healthy and mangy camels. Assiut Veterinary Medicine Journal. 1987;19(37):156-159.
21. Pandey PC, Tiwari L, Pande HC. Ethnoveterinary Plants of Uttaranchal: A Review. Indian Journal of Traditional Knowledge. 2007;6(3):244-458.
22. Pas'Ko GG, Chotchaev AD. Clinical and morphological features of sarcoptic mange in goats. Veterinariya Moscow. 1974;12:58-59.
23. Pfaffle M, Petney T, Elgas M, Skuballa J, Tarasschewski H. Tick-induced blood loss leads to regenerative anaemia in the European hedgehog (*Erinaceus europaeus*). Parasitology. 2009;136(4):443-452.
24. Sarma K, Roychoudhury P, Das G, Borthaku SK, Kalita G, Prasad H, *et al*. Seroprevalence of *Sarcoptes scabiei* var. *suis* infestation in swine population and its effect on haemato-biochemical and oxidative stress indices and its management with special reference to herbal ointment. Indian Journal of Animal Research. 2019;53(11):1489-1496.
25. Sharma MM. Haematological observations in bovine Theileriosis, Anaplasmosis and in mixed infections. Journal of Parasitology. 1979;3(2):153-165.
26. Sinha S, Kumar A, Prasad KD. Haemato-biochemical variations during mange mite infestation in pigs and its therapeutic management. Journal of Parasitic Diseases. 2004;28(2):127-129.
27. Vishe HP, Pawar K, Gupta HK, Rao GS. Prevalence and haemato-biochemical studies in parasitic and non-parasitic dermatological disorders in Surti buffalo and buffalo calves. Veterinary World. 2012;5(4):230-235.
28. Vision-2022. National Action Plan for Dairy Development. Ministry of Agriculture and Farmer's Welfare, Govertment of India. January, 2018.
29. Yacob HT. Skin defects in small ruminants and their nature and economic importance: The case of Ethiopia. Global Veterinaria. 2013;11(5):12-23.