



Use of Aqueous Extract of *Wrightia tinctoria* Leaves and Coconut Oil in Camel Mange

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Abstract

The present study was carried out during August 2019 to March 2020 for the diagnosis and therapeutic management of mange in camel. A total of fourteen positive cases of mange infestation were selected for the therapeutic trial. The therapeutic trial was carried out with the use of two different treatment viz., aqueous extract of *Wrightia tinctoria* (20%) and coconut oil in mangy camels. The mite count was performed on weekly interval up to five weeks. The camels had more than twenty Sarcoptic mites on day 0 (pre-treatment). The mite count was gradually decreased on fifth week and the mite reduction was 96.50% and 96.77% in group A & B, respectively. The haematology shows the significantly ($p < 0.05$) increase in Hb, TEC, PCV, Neutrophils and Monocytes whereas, significantly ($p < 0.05$) decreased in TLC, and Lymphocyte. The serological and mineral estimation shows the significant ($p < 0.05$) increase in values of total protein, ALT and Zinc; whereas creatinine, AST and copper were decreased significantly ($p < 0.05$). After treatment of mange infected camels with two different treatments the values of all these hemato-biochemical and micromineral constituents returned nearer to normal values of camels. Thus, aqueous extract of *Wrightia tinctoria* (20%) and coconut oil gave positive effect on mange infested camels.

Keywords: Mange mite, *Wrightia tinctoria*, coconut oil, hemato-biochemical

1. Introduction

Camels plays significant roles in social and economic development of farmers in many countries. The camel has been considered an aid to man for thousands of years in many different respects by providing meat, milk, leather, fiber, fuel, transportation (packing, riding) and racing (Solanki et al., 2013). Camels as well as other domestic animals are in continuous exposure to many pathogenic infections (Abdel-Saeed, 2020). It plays a crucial socio-economic role in these ecosystems. (Teshome et al., 2021). The single or a combination of several species of mite cause the camel mange. These species form the genera Sarcoptes, Psoroptus, Chorioptes and Demodex (Jarso et al., 2018).

Camel mange being an extremely pruritic and contagious disease is recognized as one of the most serious and damaging disease in camels caused by a small parasite "*Sarcoptes scabiei* var *cameli*" (Awol et al, 2014). The name *Sarcoptes scabiei* is derived from the Greek word "sarx" (flesh) and "koptein" (to smite or to cut) and the Latin word "scabere" (to scratch). Scabies is an obligate ectoparasitic mite that cause mange in more

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than 100 mammalian species belonging to 27 families (Shiven et al., 2020). It is the most common skin disease of camels with symptoms of itching, loss of hairs, crusting and fissuring of skin (Bornstein and Younan, 2013). The higher presence of mites in the saddle area followed by generalized form, neck region, shoulder area, hump, flank area and the thighs (Biu and Kyari, 2012). Diagnosis of camel mange by clinical findings include alopecia, erythema, numerous small vesicles, intense pruritis, anorexia, debility. The lesions are scattered throughout the body (Palanivelrajan et al., 2015). Skin scraping is taken from the affected camel for the microscopic examination to identify the mange mite. The morphological characteristics are used for identification of the mange mite (Feyera et al., 2015). The hematological findings show the lower values of packed cell volume (PCV), haemoglobin (Hb) and red blood cells (RBC) (Palanivelrajan et al., 2015).

Rural and Tribal people are using various plants as a source of medicines as they are living far away from recent medical facilities (Apaté, 2016). The people not only from rural area but also from urban area are using the herbs for effective and complete control of skin diseases without side effects (Ghalme, 2020). Since ancient times different parts of *Wrightia tinctoria* R. Br. (Apocynaceae) (*W. tinctoria*), have used in Indian systems of medicine such as Ayurveda, siddha and unani for the treatment of jaundice, malaria, psoriasis and many other elements (Srivastava, 2014). The oil extracted/prepared from the leaves of *Wrightia tinctoria* is used for the treatment of psoriasis (Singh et al., 2019).

Keeping camel under human observation and adequate management like adequate nutrition, treatment of internal and external parasites and observation of physiological status and health are very crucial and vital for camel well-being (Ashraf et al., 2014; Momenah, 2014). In India, no systematic study has been carried out so far regarding the occurrence of different parasitic diseases in camels in different geographical regions and their impact on the economy of the farmers. Hence the present study was carried out with the following objectives, viz., to study etio-diagnosis of mange in camel; to study haemato-biochemical alterations due to mange in camel; and to study the efficacy of aqueous extract of *Wrightia tinctoria* leaves and coconut oil against camel mange.

2. Materials and Methods

The present investigation was undertaken from August 2019 to March 2020. The blood samples were collected from mangy camels (n=14) for the hemato-biochemical analysis and trace mineral estimation on days 0, 7, 14, 21, 28 and 35. The hematology and biochemical estimation were performed by using of Automatic Whole Blood Analyzer (Abacus Junior Vet-5) and serum auto analyzer (CKK-300). Mite count was performed on 0, 7, 14, 21, 28 and 35 days of treatment. Deep skin scrapings were performed in 2x2 cm² from five different body parts with skin lesions on the day of sample collection. The average percentage reduction in mite count was calculated

using Abbott's formula:

$$\text{Efficacy (\% mite reduction)} = 100 \times [(C-T) / C]$$

Where, C is the arithmetic mean of the baseline count and T is the arithmetic mean of 7th or 14th or 21st or 28th or 35th day count. The therapeutic trial was carried out with the use of two different treatment in mangy camels. In group A (n=7), mange affected camels were treated with 20% aqueous extract of *Wrightia tinctoria* leaves topically, twice a day, for 35 days. In group B (n=7), mange affected camels were treated with coconut oil topically, twice a day, for 35 days. The collected data of hematological and serum biochemistry estimation were analyzed by one-way ANOVA.

3. Results and Discussion

3.1. Mite count

In the present study, all the camels had more than twenty Sarcoptic mites on 0 day (pre-treatment). The mean value of mite on day 0 was 58.71 and 42.14 in group A and B, respectively. The details of efficacy of two treatment approaches on per cent mite reduction during the course of treatment from day 0 to day 35 are presented in Table 1. The mite count was gradually decreased in different treatment groups on 35th day. The mite reduction indicates the effect of the therapy.

Table 1: Reduction in sarcoptic scabies mite count among camels treated with two different treatments

Days of treatment	Group A		Group b	
	Mean mite count	Reduction %	Mean mite count	Reduction %
0	58.71	NA	42.14	NA
7	46.86	20.19	31.00	26.44
14	34.43	26.52	19.43	37.33
21	23.86	30.71	12.14	37.50
28	11.14	53.29	4.43	63.53
35	0.43	96.50	0.14	96.77

NA: Not applicable; Gr-A: Aqueous extract topically; Gr-B: Coconut oil topically

3.2. Haematology

In present study, Haematological examinations revealed that the mean (±SE) values of haemoglobin, total erythrocyte count, pack cell volume and neutrophils were significantly increased on 35th post-treatment day in comparison to day '0'. There was significant decrease (p<0.05) in total leucocyte count, lymphocytes and eosinophils and non-significant increase in monocytes in mangy camels on 35th day in comparison to day 0. After treatment of the values of all these haematological parameters returned to normal or near normal in both treatment group presented in Table 2 and 3.

Table 2: Haematological findings of mange infested camels treated with Aqueous extract of *Wrightia tinctoria* leaves

Hematological Parameter	Day 0	Day 7	Day 14	Day 21	Day 28	Day 35
Hb (g dl ⁻¹)	6.52 ^a ±0.11	7.04 ^{ab} ±0.76	7.56 ^b ±0.12	8.29 ^c ±0.29	9.39 ^d ±0.51	10.31 ^e ±0.44
TEC (×106 μl ⁻¹)	4.89 ^a ±0.78	5.28 ^{ab} ±0.88	5.56 ^{bc} ±0.12	5.94 ^c ±0.22	6.55 ^d ±0.21	6.91 ^d ±0.23
TLC (×103 μl ⁻¹)	22.56 ^c ±0.28	20.98 ^d ±0.25	19.61 ^c ±0.32	17.90 ^b ±0.48	16.20 ^a ±0.40	15.36 ^a ±0.24
PCV (%)	17.90 ^a ±0.39	19.90 ^{ab} ±0.40	21.32 ^{bc} ±0.38	23.37 ^c ±1.05	26.32 ^d ±1.21	28.79 ^e ±0.94
L (%)	53.68 ^b ±0.14	51.94 ^d ±0.32	49.96 ^c ±0.61	47.21 ^b ±1.01	45.99 ^{ab} ±0.87	44.62 ^a ±0.52
N (%)	38.14 ^b ±0.28	40.38 ^{ab} ±0.59	42.68 ^b ±0.80	45.47 ^c ±1.23	47.25 ^{cd} ±1.05	48.89 ^d ±0.61
E (%)	7.80 ^{bc} ±0.19	7.20 ^d ±0.23	6.91 ^{cd} ±0.21	6.53 ^{bc} ±0.22	6.08 ^{ab} ±0.18	5.73 ^a ±0.15
B (%)	0.05 ^a ±0.00	0.05±0.00	0.05±0.01	0.06±0.00	0.07±0.02	0.06±0.01
M (%)	0.32 ^a ±0.07	0.42 ^{ab} ±0.09	0.37 ^{ab} ±0.04	0.71 ^c ±0.07	0.59 ^{bc} ±0.10	0.68 ^c ±0.05

Means with uncommon superscripts within the row (a,b,c,d) differ significantly (*p*<0.05)

Table 3: Haematological findings of mange infested camels treated with coconut oil

Hematological parameter	Day 0	Day 7	Day 14	Day 21	Day 28	Day 35
Hb (g dl ⁻¹)	6.55 ^a ±0.11	7.08 ^{ab} ± 0.17	7.83 ^b ±0.29	8.91 ^c ±0.43	10.30 ^d ±0.42	11.08 ^d ±0.17
TEC (×106 μl ⁻¹)	5.03 ^{ab} ±0.26	5.44 ^a ±0.20	6.03 ^b ±0.26	6.49 ^{bc} ±0.21	6.93 ^{cd} ±0.20	7.20 ^d ±0.06
TLC (×103 μl ⁻¹)	23.78 ^d ±0.30	22.25 ^e ±0.27	20.08 ^d ±0.37	17.69 ^c ±0.48	16.01 ^b ±0.35	14.99 ^a ± 0.25
PCV (%)	17.21 ^a ±0.30	19.06 ^{ab} ±0.41	21.06 ^b ±0.65	24.24 ^c ±1.31	27.37 ^d ±0.87	29.72 ^e ±0.45
L (%)	56.50 ^c ±0.55	54.43 ^d ±0.63	51.43 ^c ±0.59	48.12 ^b ±0.60	46.15 ^a ±0.27	45.23 ^a ±0.17
N (%)	34.75 ^a ±0.48	37.06 ^b ±0.62	40.72 ^c ±0.63	44.97 ^d ±0.68	47.34 ^e ±0.29	48.72 ^e ±0.25
E (%)	8.33 ^c ±0.18	7.79 ^d ±0.14	7.17 ^c ±0.11	6.33 ^b ±0.15	5.86 ^a ±0.10	5.57 ^a ±0.16
B (%)	0.03 ^a ±0.00	0.02±0.00	0.02±0.00	0.03±0.01	0.04±0.01	0.04±0.02
M (%)	0.38 ±0.06	0.68±0.10	0.64±0.07	0.54±0.09	0.60±0.07	0.42±0.10

Means with uncommon superscripts within the row (a,b,c,d,e) differ significantly (*p*<0.05)

These findings concurred well with the earlier reports of Maha, 2014; Hassan et al., 2019 and Varia et al., 2018. The decreased value of Hb, PCV and TEC in mange affected camels indicate the anaemia. It might be due to the scrape by mites on skin surface and feed on exudates and oozing of blood from small surface haemorrhages leading to decrease in haemoglobin concentration and RBC value. The decrease in total erythrocyte counts might cause decrease in Hb concentration. The damage to skin also causes stress to the animal and secondary bacterial infections leading to elevated TLC.

3.3. Biochemical analysis

The serum biochemical examinations revealed that the mean (±SE) values of total protein alanine aminotransferase (ALT) and Zinc (Zn) activity were significantly increased (*p*<0.05) and significant decreased (*p*<0.05) value of creatinine, aspartate aminotransferase (AST) and Copper (Cu) activity on 35th day in both treatment groups. The data are presented in Table 4 and 5. The reduction in total protein value is attributed to seepage of protein through exudation, extravasation of fluids

Table 4: Biochemical alteration in mange infested camels treated with Aqueous extract of *Wrightia tinctoria* leaves

Biochemical parameter	Day 0	Day 7	Day 14	Day 21	Day 28	Day 35
Total protein (g dl ⁻¹)	5.88 ^a ±0.73	5.88 ^a ±0.73	6.19 ^b ±0.79	6.54 ^c ±0.80	6.82 ^d ±0.57	7.10 ^e ±0.60
Creatinine (g dl ⁻¹)	2.59 ^b ±0.11	2.24 ^d ±0.97	1.86 ^c ± 0.79	1.60 ^b ±0.91	1.31 ^a ±0.67	1.20 ^a ±0.66
AST ((U l ⁻¹)	20.16 ^a ±0.47	20.43 ^{ab} ±0.77	20.69 ^{bc} ±0.80	20.95 ^{cd} ±0.81	21.19 ^{de} ±0.22	21.42 ^e ±0.14
ALT ((U l ⁻¹)	81.11 ^b ±0.74	76.47 ^d ± 0.54	73.05 ^c ± 0.72	68.43 ^b ±0.89	64.11 ^a ±1.00	63.28 ^a ±0.56
Cu (μg dl ⁻¹)	111.70 ^b ±1.40	104.76 ^d ±1.16	99.13 ^c ±1.30	93.04 ^b ±1.09	87.27 ^a ±0.74	84.19 ^a ±0.95
Zn (μg d ⁻¹)	74.95 ^a ±1.17	77.94 ^b ±1.02	81.53 ^c ±1.14	84.25 ^c ±0.96	87.18 ^d ±0.84	89.49 ^d ±0.89

Means with uncommon superscripts within the row (a,b,c,d,e) differ significantly (*p*<0.05)

Table 5: Biochemical alteration in mange infested camels treated with coconut oil

Biochemical Parameter	Day 0	Day 7	Day 14	Day 21	Day 28	Day 35
Total Protein (g dl ⁻¹)	5.88 ^a ±0.62	6.29 ^b ±0.87	6.56 ^b ±0.91	7.00 ^c ±0.14	7.29 ^{cd} ±0.14	7.38 ^d ±0.09
Creatinine (g dl ⁻¹)	2.48 ^b ±0.70	2.04 ^d ±0.49	1.73 ^c ±0.60	1.34 ^b ±0.80	1.17 ^{ab} ±0.40	1.00 ^a ±0.50
AST ((U l ⁻¹)	20.03 ^a ±0.66	20.35 ^b ±0.60	20.71 ^c ±0.85	21.23 ^d ±0.12	21.23 ^d ±0.77	21.34 ^d ±0.12
ALT ((U l ⁻¹)	80.55 ^b ±0.68	76.18 ^d ±0.62	72.60 ^c ±0.68	68.17 ^b ±0.55	65.10 ^a ±0.48	63.95 ^a ±0.49
Cu (µg dl ⁻¹)	115.98 ^d ±4.19	107.89 ^{cd} ±4.15	99.95 ^{bc} ±3.91	92.92 ^{ab} ±2.66	88.15 ^a ±1.62	86.57 ^a ±0.85
Zn (µg d ⁻¹)	78.50 ^a ±1.13	83.27 ^b ±0.76	88.06 ^c ±0.95	90.16 ^{cd} ±0.81	91.77 ^d ±0.63	92.25 ^d ±0.48

Means with uncommon superscripts within the row (a,b,c,d,e) differ significantly ($p < 0.05$)

to interstitial tissues and tunnels made by mites. The decrease in value of total protein whereas increase levels of AST and creatinine (Pandya et al., 2020; Hassan et al., 2019). The values of AST and ALT varies according to the liver function which is associated with the physiological and health conditions of the animal.

In rapid change of serum copper and zinc due to decreased appetite and feed intake was noticed with increased phagocytic activity of immune cells and anti-oxidant defence exhaustion during infection. the mean values of copper decreased gradually and significantly ($p < 0.05$) with increasing the duration of treatment till 28th day in comparison to the values of previous week. However, the decline in copper values was non-significant on 35th day in comparison to 28th day. Dixit et al. (2009) stated that the value of copper increase significantly when decrease the value of zinc in mange infested camels. The mean values of zinc increased gradually and significantly ($p < 0.05$) with increasing the duration of treatment till 28th day in comparison to the values of previous week. However, the improvement in zinc values was non-significant on 35th day in comparison to 28th day.

4. Conclusion

Though some haemato-biochemical values showed changes in mangy camels, there are no characteristic hematological and biochemical findings to indicate mange infestation exclusively. Therefore haemato-biochemical parameters cannot be used solely for the diagnosis of mange infestation. The use of aqueous extract of *Wrightia tinctoria* (20%) took time to resolve the lesions and eliminate mites, but gave positive effect on affected animals at par with coconut oil.

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