

SKIN CANDIDIASIS IN DROMEDARY CALVES

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ABSTRACT

Therapeutic potential of three formulations consisting of 2% potassium iodide; 6% sulphur in mustard oil; and 6% sulphur and 3% salicylic acid in mustard oil were evaluated topically in naturally occurring cases of skin candidiasis in camel calves. All the three treatments were found effective with almost similar application schedule but with variable duration of treatment. The present study offers to minimise morbidity in young camel calves due to skin candidiasis.

Key words: Camel, mustard oil, potassium iodide, salicylic acid, skin candidiasis, sulphur, treatment

Skin candidiasis is an acute and contagious fungal skin infection of camel calves of less than one year of age, which causes morbidity in terms of reduced weight gain. Lesions of the disease are initially observed on the back near the hump; later on the lesions extend towards the abdomen and may cover the whole body. It may lead to bleeding and ulceration of skin and may result in weakness and debility of calves and when infection occurs in a herd it affects almost every young calf in that particular herd. Self cure has been observed in most of the cases (Tuteja *et al*, 2010). Wernery *et al* (2007) reported failure in the treatment of skin candidiasis in dromedary calves despite intensive treatment; the lesions did not heal until a year later, when the dromedary calves changed their fur. Various ethnoveterinary practices are practiced by the farmers for the treatment of this condition in India and a successful treatment of this condition has been reported by Tuteja *et al* (2010). Three therapeutic regimens were tried in naturally occurring cases at an organised dromedary farm which are reported here.

Materials and Methods

Fifteen naturally infected camel calves of an organised herd were taken for the present study. These calves were divided into three groups of five calves each, in such a way that each group comprises the calves with varying degree and severity of the lesions (Fig 1-3). In calves of all the groups entire dead tissue was removed by scraping with a piece of brick stone as adopted by the many camel owners as a traditional method. Skin scrapings of these

calves were collected aseptically and examined for mycological examination by culturing on Sabourauds dextrose chloramphenicol agar plates. Following treatments regimens were given in these calves.

Gr. 1: 2% Potassium iodide in distilled water was applied topically with a cotton cloth on alternate days till complete recovery of the lesions.

Gr. 2: 6% sulphur (80% sulphur; contact fungicide used in agricultural operations) in mustard oil (*Brassica* spp.) was applied topically with a cotton cloth on alternate days till complete recovery of the lesions.

Gr. 3: Lesions were irrigated with sodium thiosulphate (10%) solution on the 1st day. On next day 6% sulphur (80% sulphur; contact fungicide used in agricultural operations) and 3% salicylic acid in mustard oil (*Brassica* spp.) was applied topically with a cotton cloth on alternate days till complete recovery of the lesions.

Lesions were observed before each application for growth of the fungus in terms of debris formation or visibility of mycelium, healing of the lesions in terms of healthy appearance of the skin and growth of the hairs. Finally skin scrapings from these calves were examined mycologically with in three days of the discontinuation of the therapy.

Results and Discussion

Type of lesions, pattern of spread, age group of the animals involved and causative agent identified were in accordance with the findings of Wernery *et al* (2007) and Tuteja *et al* (2010). Camel farmers or traditional healers are adopting certain ethno

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veterinary practices, for the management of this and other skin infections. These treatments do include sulphur in mustard oil (1:10), topical application, alternate days for 1-2 week (Tuteja *et al*, 2011). In present study, three treatment formulations were designed by using the ethnoveterinary knowledge of the farmers and the scientific relevance behind the products. All the three treatments were effective with variable duration (table 1; Fig 4-9). This is contrary to the findings of Wernery *et al* (2007) that in cases of skin candidiasis in camel calves despite intensive treatment, the lesions did not heal until a year later, when the dromedary calves changed their fur.

Recovery in gr. 1 animals was in accordance with therapeutics in other mycological infections. In cases of trichophyton infection, treatment of affected camelids was suggested two per cent tincture iodide by using directly to lesions daily for two weeks. The less caustic povidone-iodine preparation diluted 1:4 may be equally effective (Murray, 1998). Potassium iodide is one of the oldest therapeutic modalities for the treatment of sporotrichosis (Tomimori-Yamashita *et al*, 1998). Two cases of cutaneous phycomycosis of horses were successfully treated by surgery and potassium iodide therapy (Owens *et al*, 1985). Most of the patients with entomophthoromycosis responded very well to oral potassium iodide therapy (Sujatha *et al*, 2003).

Recovery in gr. 2 animals support the facts that, sulphur, a yellow, non-metallic element, possesses medicinal properties, making it useful in treating many skin conditions. For nearly 70 years, sulfur has been used as a therapeutic agent, according to the "Journal of Drugs in Dermatology." Although the exact mechanism of how sulphur works is unknown, it is believed to help in part by breaking down keratin, by being toxic to fungi and by inhibiting the growth of acne. Batra (2003) evaluated mustard oil

as health oil in rat model, reported glucosinolate, the pungent principle in mustard oil, to possess anti-bacterial and anti-fungal properties. Some antifungal activity has also been observed with mustard oil (Nielsen and Rios, 2000; Dhingra *et al*, 2004; Sitara *et al*, 2008). In cats the combination of oral itraconazole and topical lime sulphur rinses were effective and safe for the treatment of dermatophytosis (Newbury *et al*, 2007).

Recovery in gr. 3 animals was in accordance with the findings of Tuteja *et al* (2010) in camel calves with slight modifications where in initially entire dead tissue was removed by scraping and spray bath was made with 10 % sodium thiosulphate. Next day an ointment made of sulphur- 6gm + salicylic acid- 3gm + mustard oil- 100 ml was applied on the affected skin daily for five days. On the seventh day again spray bath was done with 10 % sodium thiosulphate and the same ointment was applied daily for next six days. Then skin scrap was removed and 10 % sodium thiosulphate was applied daily for next two days. Along with this treatment mineral mixture feeding was done daily for 30 days at the rate of 20 gm per calf per day. This treatment schedule resulted in complete recovery of lesions in all the five cases. Recurrence of the condition in these calves was not observed up to one year of age. The present schedule simplifies the procedure especially in terms of treatment by the camel owners. The salicylic acid may play a central role in plant disease resistance, particularly during systemic acquired resistance (Ross, 1961). Thus, the level of salicylic acid increases several fold in tobacco and cucumber after pathogen infection (Malamy *et al*, 1990 and Rasmussen *et al*, 1991) and this increase is correlated with systemic acquired resistance (Malamy *et al*, 1990 and Metraux *et al*, 1990). Furthermore, transgenic tobacco and Arabidopsis plants that are unable to accumulate salicylic acid due to the expression of the bacterial nahG gene (NahG plants) which fail to develop systemic acquired resistance and exhibit increased susceptibility to an infection with virulent and avirulent pathogens (Delaney *et al*, 1994 and Gaffney *et al*, 1993).

All the three treatments were safe without any adverse reactions noticed. All the treatments were comparable in cost, about Rupees 250/- each calf towards the cost of medications, thus can be considered advantageous over the about 15% loss in weight at one year of age in calves suffering with skin candidiasis (Tuteja *et al*, 2010) besides relieving the animal sufferings.

Table 1. Efficacy of different treatment regimens against skin candidiasis in camel calves.

Treatment groups	Duration of treatment	Gross recovery from lesions	Mycological recovery	Recovery of hair growth at the end of the treatment
Gr. 1	10 treatments (19 days)	5/5	5/5	2/5
Gr. 2	8 treatments (15 days)	5/5	5/5	2/5
Gr. 3	7 treatments (14 days)	5/5	5/5	3/5



Fig 1. Infected dromedary calf herd.



Fig 4. Skin of calf after debris removal.



Fig 2. Lesions on heavily infected camel calf.



Fig 5. Calf of gr. 1 under potassium going iodide application.



Fig 3. Camel calf showing low grade infection.

The age group involved in the present study and efficacy of various products studied is in comparison to the mycotic infections in cattle. Calves at weaning time are highly susceptible to ringworm infection (Al-Ani *et al*, 2002). This may be in part due to their weak immunity and the high pH of the skin (Radostits *et al*, 1997). Al-Ani *et al* (2002) reported effective cure of ringworm in cattle calves with topical application of an ointment containing benzoic acid-6 g, salicylic acid-3 g, sulfur-5 g, iodine- 4 g and vaseline-100 g, with two to three applications at 3-4-day intervals.



Fig 6. Calf of gr. 1 after 72 hrs of 1st treatment.



Fig 7. Calf showing lesions before recovery phase.



Fig 8. Calf under last dose of oily base application.



Fig 9. Completely recovered calf.

Many topical treatments have been reported to be successful in cattle. Because spontaneous recovery is common, claims of efficacy are difficult to substantiate. Valuable individual animals should still be treated because this may well limit both progression of existing lesions and spread of infection to other animals in the herd. Thick crusts should be removed gently, and the material burned or disinfected with hypochlorite solution. Treatment options depend on the limitations on the use of some agents in animals meant for slaughter. Individual lesions can be treated with miconazole or clotrimazole lotions. The decision to use topical therapy should

be based upon the owner's or breeder's ability and willingness to pour or sponge the product over the entire surface of the body of the infected animals, whatever the distribution of the lesions could be. Spot treatment of lesions is not recommended. The clipping of the hair coat is useful, especially in severely infected animals. Clipping makes topical therapy application easier and allows for better penetration of the drug. However, clipping must be performed carefully. Moreover, the unavoidable contamination of the material such as clipper etc. with infected hairs requires a meticulous disinfection after clipping. Crusts should be removed and further destroyed, before the application of topical antifungal drugs.

Dermatophytosis is considered to be self-limiting disease in immunocompetent animals. Immune response may be sufficient to control the

spread of the cutaneous lesions of dermatophytoses. However, antifungal therapy should be systematically recommended in order to shorten the course of the infection and to reduce dissemination of arthroconidia to others animals and into the environment. Systemic antifungal drugs contribute to speed the resolution of the infection whereas topical antifungals reduce the risk of transmission and environmental contamination. Treatment failures may be due to drugs resistance, improper administration or misdiagnosis. Environmental disinfection and the complete separation of infected animals from non-infected ones are also required. The physical condition of dromedary calves was affected following skin candidiasis (Wernery *et al*, 2007 and Tuteja *et al*, 2010). The validation of treatments for skin candidiasis used in the present study would help is treating such camel calves.

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