

Treatment of bovine dermatophilosis with *Senna alata*, *Lantana camara* and *Mitracarpus scaber* leaf extracts

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Abstract

This study describes interesting preliminary results on the therapeutic effects of ointments prepared with extracts of medicinal plants on bovine dermatophilosis. Our results show that the use of ointments made with ethanolic extracts of leaves of *Senna alata*, *Lantana camara* and *Mitracarpus scaber*, as topical treatments on chronic crusty or acute lesions of dermatophilosis, induces healing of the disease in the nine infected animals treated without recurrence. This is opposed to what is observed by using oxytetracycline, terramycin long-acting (TLA), or procaine-penicillin, antibiotics commonly used parenterally for the treatment of dermatophilosis in the Republic of Benin which could not prevent the recurrence of the disease. These ointments, when applied once a day for 8–15 days, provoked the falling off of the crusts after 3–4 days of treatment. Hair grows on the treated areas, which heal without scarring, within 3–4 weeks after the end of the treatment. The healed animals became free of dermatophilosis without recurrence for more than 3 years and were in good health.

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1. Introduction

Dermatophilosis infection in cattle is an enzootic bacterial skin disease in tropical and subtropical countries. It may be acute or chronic, partial or progressive exudative dermatitis that could lead to death of the animal, and cause economic losses to farmers, in the case of a severe acute form.

The treatment of dermatophilosis still remains a matter of great concern owing to the recurrence of the disease and the difficulties to cure it using antibiotics by the parenteral route. Terramycin long-acting (TLA) was described to be the only drug effective in parenteral treatment of dermatophilosis (Ilemobade et al., 1979), while 2 years later, it was claimed that animals treated with TLA became reinfected even after recovering from the disease (Ogwu et al., 1981). One acaricid bath a week with Butox[®] (a synthetic pyrethroid), associated with 75000 IU of spiramycin per kilogram of body weight parenterally healed the infection in 85% of cases, while TLA, in the same conditions cured

89% of the infected animals. The healed animals, when controlled after 45 days, showed no recurrence (Sarradin et al., 1985). However, the focus is still on topical treatment of dermatophilosis, so many other treatments were tested mixing several natural drugs, regardless of the risk of toxicity and without scientific protocol, but none of them gave complete healing without recurrence (Nwufoh, 1985). Owing to the various economic problems of our countries, we decided to explore the therapeutic activities of three medicinal plants used to treat human skin infections in traditional medicine in Benin, on bovine skin lesions due to *Dermatophilus congolensis*.

Previous data on these plants indicate that aqueous extracts of leaves of *Senna alata* were used to treat eczema, itching and skin infections in humans (Palanichamy and Nagarajan, 1990; Morah and Otumu, 1991; Nwalozie et al., 1994). In animals, it also cured an infestation by the mite, *Psoroptes cuniculi* Delafond (Acarina), in rabbits in Indonesia (Murdirati and Marurung, 1991). Aqueous extracts of *Lantana camara* had antifungal activity (Singh et al., 1993) and the alcoholic one was shown to possess insecticidal properties (Mukhtar and Ahmad, 1991; Saxena et al., 1992). *Lantana camara* was also reported to be toxic on ruminants.

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Intoxications results from the ingestion of toxic varieties of *L. camara* containing high quantities of lantadene A and lantadene B, two triterpenic acids inducing intra hepatic cholestasis leading to liver injury with jaundice, photosensitisation and ruminal stasis (Pass, 1986; Ghisalberti, 2000). Seawright and Hrdlicka (1977) observed similar toxic effects in experimental sheeps after oral and intraruminal administration of lantadene A and lantadene B. However, in indigeneous practice, people use aqueous extracts of *L. camara* externally to cure skin diseases in Republic of Benin, without any report on toxicity (de Souza, 1988).

Mitracarpus scaber leaf extracts were used to treat successfully human dermatitis and eczema in Benin (Adjanohoun et al., 1989; Adjanonhoun, 2001), while its essential oil was used to treat ringworm and eczema in humans in Nigeria with good results (Ekpendu et al., 1993). Later, Ekpendu et al. (1994) showed the efficacy of petroleum ether and methanolic extracts of *M. scaber* in the treatment of skin diseases and other infections.

Our aim was to find simple, cheap, riskless and effective natural remedies for the topical treatment of dermatophilosis in Benin.

2. Material and methods

2.1. Plant material

In this study, we focused our work on alcoholic leaf extracts of three medicinal plants including *S. alata* (L.), synonym *Cassia alata*, Roxb. (Fabaceae: Cesalpinioideae); *L. camara* (Verbenaceae); *M. scaber* Zucc. and ex Schult + Schult.f. (Rubiaceae). These plants were collected in the areas of Cotonou, Abomey Calavi and were identified and authenticated by Professor Dr. E. Akoegninou (Department of Botanique (UAC), Director of the Na-

tional Herbarium of the University of Abomey Calavi). Voucher specimens were deposited in the National Herbarium of the University of Abomey Calavi in the Republic of Benin.

The plants were first dried at room temperature for 5 days and were turned over every day. The leaves were finally dried in an oven at 50 °C for 48 h and were reduced to coarse powder (European Pharmacopeia, 2002) using a grinder.

2.2. Preparation of ointments with alcoholic extracts of plants

For each plant, we macerated 500 g of powder in 4 l of ethanol (Merck) for 72 h under constant shaking. The mixture was filtered and concentrated at reduced pressure at 50 °C. The yields of extraction were, respectively, 22.88% for *S. alata*, 12.68% for *L. camara* and 12.62% for *M. scaber*. Then, an ointment was prepared with each plant extract by mixing three parts of karite butter (prepared from the nut of *Vitellaria paradoxa* C.F. Gaertn., Sapotaceae, synonym *Butyrospermum parkii* (G. Don) Kotschy) and one part of extract. The resulting ointments were kept in pots at room temperature until use.

2.3. Schedule of ointment application

The treatment was carried out in the rainy season, July 1998, on nine chronically infected cows showing established oozing and hard crusty lesions of dermatophilosis.

Smears and culture of crusts collected from these animals were performed first to confirm the presence of *D. congolensis* (van Saceghem) Gordon (Dermatophilaceae, Actinomycetales). The animals were treated against worms with Benzal[®] (Albendazol, an imidazol derivative, Laprovect, France). The rectal temperature of these animals was determined daily and they were normally kept in the herd

Table 1
Treatment schedule for naturally infected animals with ointments of plant extracts

Animal reference no.	Lesions observed before treatment	Plant extract used	Number of applications	Start of crusts falling off
TC1	Crusts confluent lesions on the flank and the shoulder under erected hair	<i>Senna alata</i>	Once a day for 10 days	Fourth day of treatment
TC2	Crusts lesions under erected hair on the back, the flank, the belly and the shoulder	<i>Lantana camara</i>	Once a day for 10 days	Fourth day of treatment
TC3	Oozing crusty lesions on the perineum and scrotal region and the belly	<i>Mitracarpus scaber</i>	Once a day for 8 days	Third day of treatment
TO1	Hard and oozing crusty lesions on perineum and scrotal region and the belly and the breast	<i>Senna alata</i>	Twice a day for 15 days*	Fourth day of treatment
TO2	Crusty lesion on the breast	<i>Lantana camara</i>	Once a day for 10 days	Third day of treatment
TO3	Hard crust lesions scattered on the back and the rump	<i>Mitracarpus scaber</i>	Once a day for 8 days	Third day of treatment
TS1	Hard sheet of crust on the back and the rump	<i>Senna alata</i>	Once a day for 10 days	Fourth day of treatment
TS2	Hard and oozing crusty lesions on perineum belly and udder region	<i>Lantana camara</i>	Twice a day for 10 days*	Fourth day of treatment
TS3	Hard confluent crusts on the flank under erected hair on the shoulder, the flank, the back and the thigh	<i>Mitracarpus scaber</i>	Once a day for 8 days	Third day of treatment

* Ventral oozing lesions.

without particular care. Three animals were treated with each plant extract ointment for 8–15 days as indicated in Table 1. When the damaged area showed hard crusts, the ointments were applied once a day. When the damage was located on the ventral parts of the body, which are in continuous contact with the soil or high humidity areas such as the belly, breast, mammary glands, scrotum and perineum area, the ointments were applied twice a day to allow prolonged contact between the extract and the wound in order to avoid crust reformation or other secondary infections.

3. Results

The application of ointments containing alcoholic extracts of the different plants penetrated and softened dermatophilosis crusty lesions. The crusts started falling off from the lesions after the third or the fourth day of application of the ointment, leaving wounds or erythematous areas as showed in pictures 1b, 2b and 3b (Fig. 1).

The falling off of the crusts was progressive. They all fell off within 8 days of treatment and the rough border of

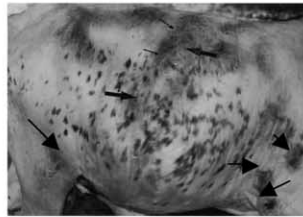
Pictures (a) showing lesions on infected animals before the treatment

Pictures (b) showing erythematous areas left by falling off of the crusts

Pictures (c) showing healed animals after the treatment



Animal 1a: crusts, confluent lesions on the flank, the shoulder under erected hair



Animal 1b: erythematous area left by falling off of crusts after the 4th day of treatment with *Senna alata*



Animal 1c: healed 3 weeks after the end of the treatment with *Senna alata*



Animal 2a: crusty lesion on the breast



Animal 2b: erythematous area left by falling off of crusts after the 3rd day of treatment with *Lantana camara*



Animal 2c: healed 3 weeks after the end of the treatment with *Lantana camara*



Animal 3a: oozing crusts on perineum and scrotal region and the belly



Animal 3b: erythematous area left by falling off of crusts after the 3rd day of treatment with *Mitracarpus scaber*



Animal 3c: healed 3 weeks after the end of the treatment with *Mitracarpus scaber*

Fig. 1. Infected, treated and healed animals.

the crusty lesions disappeared. Wounds dried up progressively and growth of hair was observed after 8 days. The skin of the animals healed and looked normal without any scarring within 3–4 weeks after the end of the treatment as illustrated in pictures 1c, 2c and 3c (Fig. 1).

The disease did not recur on the treated animals over at least 3 years after the last application: they keep a nice and smooth skin, and are good looking.

The ointments cured ordinary wounds provided by thorny bushes or other trauma on the body of the animals. They also acted as fly repellents, preventing the treated areas from suffering any other infections.

4. Discussions and conclusions

Topical treatment may be the best way of limiting the spread of *D. congolensis*. The extracts as ointments, applied early on localised crusts as soon as they appeared, induced good results in a short period: the ointment reached the affected area directly, and penetrated through the epidermis of the skin. Crusts detected under erected hair and treated with any of the ointments healed within 3 weeks. When the crusty lesions were oozing, the direct and continuous contact of the extract with the area left by falling off of the crusts inhibited the development of *D. congolensis*. Our ointments destroyed directly *D. congolensis* in the border of the crusty lesions which became smooth. In fact, we think that when animals are parentally treated with antibiotics such as oxytetracycline (Alamycin®), TLA or procaine-penicillin, some crusts could remain and the rough border of the damaged skin did not completely disappear. Then, *D. congolensis* which can persist in such areas, starts to develop again in the next rainy season. This could explain the fact that none of these antibiotics prevented the recurrence of the disease on treated animals.

Other topical treatments have failed because of the thickness of the crusts preventing the drug from coming into direct contact with the infected areas (Lloyd and Noble, 1982). Our ointments infiltrated the crusty lesions, acting by softening the hard crusts and their borders, and induced their falling off at the third or fourth day, as observed with parenteral treatment with oxytetracycline (Wilson and Amakiri, 1989). Furthermore, these ointments of plant extracts were more efficient than TLA and procaine-penicillin, commonly used in private and governmental farms in the Republic of Benin, that induced falling off of crusts on the seventh and eighth day only. These latter observations are in accordance with those of Wilson and Amakiri (1989) who showed that TLA induced falling of the crusts on the seventh day of treatment and biomycin on the ninth day.

According to Lloyd et al. (1990), oxytetracycline only reduced the rate of recurrence of this disease, and when animals were well fed, while our remedy gave more satisfaction, as the treated animals did not suffer a recurrence for more than 3 years. Such conclusions are in concordance with the results reported by some authors showing the ef-

ficacy of these plants on skin diseases in man: the chronic fungal disease, *Pityriasis versicolor* was cured without recurrence for 1 year by using aqueous extracts of fresh leaves of *S. alata* (Damodaran and Venkataraman, 1994).

When comparing the efficacy of the different ointments containing plant extracts with regards to the number of applications, *M. scaber* appeared to be more efficient than the two other plants but it showed some abrasive effect on the wounds if applied directly on their surface, and the wounds cured later.

Our results show that the topical application of ointments prepared with the three ethanolic plant extracts were effective in curing bovine dermatophilosis due to *D. congolensis* in the nine infected animals without recurrence beyond 3 years, and quickly repair skin wounds and other skin infections. Their repellent properties reduced any risk of infection due to other micro-organisms.

It is the first report of the use of these plants to cure dermatitis in animals. Furthermore, these ointments are cheaper, easier to produce and give better results than antibiotics used parenterally, but further experiments have to be performed on a larger scale to capture the full range of severity of the disease and analyse possible resistance to that treatment.

Nevertheless, our promising results indicate that the use of these ointments might be the best means to limit the spread of that disease and to heal the skin lesions without any risk of over doses despite the prolonged treatment it may require for effective therapeutic results in some persistent cases. In this respect, the economic impact resulting from the use of these convenient, efficient and cheap ointments will be of great benefit for the development of animal production and of mixed farming.

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