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Full Length Research Paper

Therapeutic effects of *Tephrosia vogelii* ointment in the treatment of bovine dermatophilosis

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The therapeutic effect of a cream ointment prepared from the leaves of *Tephrosia vogelii Hook* F., was tested for the treatment of bovine dermatophilosis in four local cows of the Sokoto Gudali breed and two 50% Holstein Friesian crosses in Jos, Plateau State Nigeria. All the selected animals used in this study were naturally infected by the *Dermatophilus congolensis* organism. The selected animals all showed established, oozing, and hard crusty lesions on their skins, typical of dermatophilus lesions. All the animals had various degrees of infections ranging from mild to severe, with the lesions located on different parts of the skin. Six of the animals were selected for the experimental treatment with the prepared ointment made from the leaves of *T. vogelii*, while the rest of the infected animals in the herd were kept untreated as the control. A cream ointment was prepared from the leaves of *T. vogelii* for topical application on the skin lesions of the affected animals. The ointment was applied liberally on the lesions every other day. The crusts on the skins of the affected animals were observed to start falling off from the third day in the local animals, and on the sixth day in the crosses, following the first application of the ointment. Complete healing and new hair growth was observed within the period of 4 to 8 weeks. The affected areas of the skins became completely healed and normal without any problem in all the affected animals. No healing or improvement was observed in the control group that was left untreated.

Key words: *Tephrosia vogelii*, bovine dermatophilosis, cream ointment.

INTRODUCTION

In most developing countries of the world, majority of the livestock farmers rely on traditional healthcare practices to keep their animals healthy. These traditional healthcare services are provided mainly by the local or indigenous folklore ethnoveterinary medicine practitioners who depend solely on the use of medicinal plants. Most of these herbal plants have been used for centuries in the management and prevention of a wide range of livestock diseases by traditional healers and have been employed for same purpose in both animals and humans. The use of ethno-veterinary medicines in most developing countries has been found to be of great value in areas where allopathic or orthodox veterinary medicines are often beyond the reach of the poor livestock producers. It is also known to play an important role in grassroots development which seeks to empower local people by enhancing the use of their own knowledge and resources to develop their economy and the livestock industry.

Dermatophilosis is primarily an epidermal infectious disease of herbivores, but may occur in man and other animals as an acute, chronic, local or progressive, and sometimes fatal exudative dermatitis. In sheep, the disease is often referred to as strawberry foot rot or mycotic dermatitis or lumpy wool. In cattle it is known as cutaneous streptothricosis. The local name for the disease in Nigeria is Kirchi (Awe and Arowolo, 1999). Dermatophilosis is caused by a bacterium known as *Dermatophilus congolensis* (European Pharmacopea, 2002). The organism is usually restricted to the epidermal region of the skin, especially the stratum corneum of the

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Table 1. Results of the phytochemical screening of *T. vogelii*.

Parameter(s)	Results
Saponins	+ve
Anthraquinone	-ve
Cardiac glycosides	+ve
Steroids	-ve
Flavonoids	+ve
Tannins	-ve
Alkaloids	-ve

skin of infected animals. It appears as clusters of cells in various shapes and sizes ranging from coccoid or cuboidal to branching filamentous forms. The bacterium can grow on blood agar and other artificial media. It is a gram positive and catalase positive organism. It is non-acid fast, and stains best with cabol fushin (Makinde, 1981).

Tephrosia vogelii hook F. is a small leguminous shrub which grows to a height of about three to four meters. It is a perennial shrub with mauve flowers and many pods. This species helps in the restoration of soil fertility (Chapman and Hall, 1994). It is maintained as a semi cultivated plant in dooryards in some primitive areas where it is used for poisoning fish because the plant's leaves, branches and seeds are used for stupefying fish, which remains fit for human consumption. The toxicity of *T. Vogelii* is lower than that of other plant species used in the industry. *T. vogelii* is traditionally used for its ichthyotoxic, insecticidal and food parasiticidal properties (Ibrahim et al., 2000). Several isoflavonoids have been isolated from Tephrosia species the compounds isolated exhibited different effects ranging from anti-feedant, antibacterial, insect-repellant and insecticidal (Machocho et al., 1995). Small-scale farmers in Kenya are reportedly using the roots and leaves of *T. vogelii* to control diseases and pests on their crops (Wanga et al., 2000). Tephrosia is a potential source of rotenone, an important nonresidual insecticide, and tephrosin which is the main active compound useful in killing fish. The seeds are saved and planted, and the plants are tended but may also occur in the wild state.

MATERIALS AND METHODS

Plant collection, gabling and drying

The leaves of *T. vogelii* were collected from farmlands areas around Jos, Plateau State, Nigeria. Only the fresh leaves of the plant were harvested and used for this study. The leaves were harvested at the beginning of the month of October (towards the end of the rainy season and the beginning of the dry season). The period of the plant harvesting was designed to coincide with the period of the plant's vegetative and 50% flowering stages to enable a maximum yield of the plant's active medicinal compounds (Wanga et al., 2000). After the collection, the leaves that were mistakenly gathered together with the leaves of *T. vogelii* during the collection were carefully sorted out of the collection and discarded. After the collection of the leaves they were dried in open air in an area with minimal solar intensity but with adequate aeration to ensure proper drying and to prevent the loss of any vital active compounds of the plant.

Plant identification and laboratory confirmation of *Dermatophilus congolensis*

After the plant collection, part of the leaves was taken to and identified in the Nigerian College of Forestry in Jos. Samples of the crusty lesions were also collected and taken to the Dermatophilosis Unit of the National Veterinary Research Institute, Vom, for confirmation of the organism. The smears and cultures of the samples were confirmed positive for the presence of *D. congolensis*.

Phytochemical analysis of the plant

After the collection, identification and extraction of the plant, a phytochemical analysis of the plant extracts was conducted to determine the presence of phytochemicals like alkaloids, anthraquinones, cardiac glycosides, flavonoids, saponins, steroid/terpenes and tannins. The results of the phytochemical screening however, revealed the presence of only cardiac glycosides, tannins, saponins and iso-flavonoids. The phytochemical screening was conducted according to the standard procedures described by Trease and Evans (1989) and Sofowora (1993). The procedures for the phytochemical screening are shown below, and results summarised and shown in Table 1.

Test for alkaloids

0.5 g of the extract was added to 3 ml of 1% aqueous hydrochloric acid and stirred in a steam bath. The mixture was then filtered, and 1 ml of the filtrate was poured in to two test tubes. 3 drops of Mayer's reagent and 1% picric acid were added to either of the test tubes. A precipitation with any of the two reagents would have indicated the presence of alkaloids, but none were present.

Test for anthraquinones

0.5 g of the extract was placed into a dry test tube and 5 ml of chloroform was added. The content of the test tube was filtered after shaking for 5 min. The filtrate was also shaken with an equal volume of 100% ammonia. There was no colour change to indicate the presence of anthraquinones.

Test for cardiac glycoside

0.1 g of extract was dissolved in 1 ml of glacial acetic acid containing one drop of ferric chloride solution. 1 ml of concentrated sulphuric acid was added by pouring along the side of the test tube. A brown ring formation indicated the presence of deoxysugar characteristic of cardenolides.

Test for flavonoids

1 g of the powdered plant sample was detanned by washing

several times with acetone. The acetone was evaporated from the sample in a hot water bath. Distilled water was then added and filtered. To 5 ml of the filtrate, 5 ml of 20% sodium hydroxide was added, and to another tube of 5 ml of the filtrate, 5 ml of lead acetic solution was added. A yellow colouration with either of the reagents indicated the presence flavonoids.

Test for saponins

0.5 g of extract was added to 5 ml of distilled water and shaken very well. Persistent frothing even after warming was an evidence for the presence of saponins.

Test for steroid/terpenes

0.1 g of the extract was dissolved in 1 ml of chloroform. 1 ml of acetic anhydride was then added to the mixture. Two drops of concentrated sulphuric acid were added gently along the side of the test tube. A reddish brown colour at the interface was indicative of the presence of steroids and terpenes.

Test for tannins

1 ml of distilled water was added to 0.5 g of extract and stirred. The mixture was then filtered and few drops of ferric chloride were added to the filtrate. A blue-black precipitate indicated the presence of tannins.

Selection of animals

The selected animals used for this study included two 50% Holstein Friesian crosses, and six local animals of the Sokoto Gudali breed. All the selected animals used in this study were naturally infected by the *Dermatophilus congolensis* organism. The selected animals all showed established, oozing, and hard crusty lesions on their skins typical of Dermatophilus lesions. All the animals had various degrees of infections ranging from mild to severe, with the lesions located on different parts of the skin. Six of the animals were selected for the experimental treatment with the prepared ointment made from the leaves of *Tephrosia vogelii,* while the rest of the infected animals in the herd were kept untreated as the control group.

Preparation of the ointment

The fresh leaves of the plant were air dried and pulverized to fine powder using a mortar and pestle. 200 g of the pulverized powdered leaves were weighed out into a container containing 1000 ml of petroleum Jelly and properly mixed. The mixture was gently, but thoroughly stirred to obtain a uniform distribution of the powder and enhance the complete diffusion of the active compounds of the plant into the petroleum jelly. The preparation was then kept for 3 days after which it was liberally applied to the skin lesions of the affected animals.

Stabilization of the animals

Prior to the commencement of the treatment, the animals were stabilized for a week during which they were pre-treated against helminthosis using albendazole. Their rectal temperatures were also taken prior to the commencement of treatment and were also checked periodically during the course of treatment. The animals were kept in the herd with other animals and were fed normally without any particular attention.

Methodology of application

The treatment was carried out during the months of October to December. The ointment was applied directly on the areas of the affected skin that had the crusty lesions, by gently and liberally smearing the ointment on and around the affected areas making sure that enough ointments were deposited on the affected areas so that areas with larger crusts can adequately be penetrated by the active compounds to reach the *D. congolensis* organism under the crusts. The treatment was done in the mornings before the animals were released to go for grazing.

RESULTS

Phytochemical screening

The results of the phytochemical screening are shown in the tables.

Treatment

The application of the cream ointment prepared from the leaves of *T. vogelii* produced a generally good healing response. In the four local cows of the Sokoto Gudali breed, the crust were observed to start falling off on the third day post treatment, while in the two 50% Holstein Friesian crosses, the skin crusts started falling off on the sixth day. Healing was observed to be completed in all the treated animals within four to six weeks. However, full hair growth was observed to be completed within six weeks in the four local cows of the Sokoto Gudali breed, while it lasted up to eight weeks in the 50% Holstein Friesian crosses.

It was also observed in the two crosses that the rate of fall of the skin crusts appeared to be affected by both the location of the crusts on the skin, and the sizes of the crusts. The large crusts that were located on the more hairy areas of their bodies' especially on the back, close to the hump, either did not fall off immediately after healing, or in some cases did not even fall off the skin, but got stuck to the skin, held in place or supported by the surrounding hair tufts, but when little pressure was applied, the crusts fell off. When closely examined, the areas under most of the "retained" crusts were already healed with new hair already growing under the retained crusts. However, it was observed that the untreated lesions on the control group did not heal as in the case of the treated animals but rather continue to grow and increase in size.

Table 2. Days taken for the crusts to start falling, for the crusts to complete falling, and for complete healing and hair growth occur.

Response to treatmant	Animals identification number					
	185	006	1020	86	906	1002
Time taken for crusts to start falling off	Day 3	Day 6	Day 6	Day 3	Day 3	Day 3
Time taken for crusts to complete falling off	2 weeks	5 weeks	5 weeks	4 weeks	3 weeks	3 weeks
Time taken for complete healing to occur	5 weeks	6 weeks	6 weeks	6 weeks	4 weeks	5 weeks
Time taken for full hair growth to occur	6 weeks	8 weeks	8 weeks	6 weeks	6 weeks	6 weeks

Figure 1.

DISCUSSION

The result obtained from this study showed that the ointment prepared from *T. vogelii Hook* F. was potent and effective in the treatment of bovine *D. congolensis* infection. In most of the treated animals, the healing response was observed to commence with the falling off of the crusts on the third day after treatment with the ointment (Table 2). The shortest time taken for healing to be completed was observed to be four weeks (in the Sokoto Gudali animals), while the longest time was 6 weeks (in the 50% crosses).

In the two 50% crosses, Figure 1 the infection was seen to be more severe with larger crusts forming on their bodies than in the pure local ones which had smaller crust. This was thought to be due to the high susceptibility of the exotic breeds and their crosses to dermatophilosis compared to the local animals.

It was also observed that the animals that had mild infections with fewer crusty lesions and those that had the infection for the first time responded faster to the treatment, and had shorter recovery time than those with severe or chronic cases.

On a general note, the healing effects produced by the ointment prepared from *T. vogelii* showed that the preparation was both potent and effective in the treatment of bovine dermatophilosis. Other plant extracts that have not been able to produce the desired effects might have failed because they lacked the potency or efficacy of *T. vogelli* in the treatment of bovine dermatophilosis. Also, antibiotics that have produced lesser therapeutic effects have not succeeded because

according to Ali-Emmanuel et al. (2003), the use of antibiotics has often not prevented a recurrence of the disease because the antibiotics are short lived and do not persist throughout the year. The surviving organisms therefore, develop resistance to the drugs, making the disease to become more difficult to treat even with other topical drugs. Also, according to David et al. (1990), the treatment of dermatophilosis with antibiotics like oxytetracycline or procaine penicillin, can only cause the *D. congolensis* organism to persist under the retained crust and would start to develop a gain the next rainy season.

However in this study, the crusts started falling off on the third day in most of the animals that were treated with the crude extracts of *T. vogelii*, This was also followed by complete healing and hair growth indication that the preparation was effective and superior to other plant extracts and antibiotics in the treatment of bovine dermatophilosis.

The active compounds in the cream could penetrate or permeate the crusty lesions into the affected areas of the skin thereby affecting the growth and development of the organism. This resulted in the falling off of the crusts and in complete healing, with the full hair growth.

Observations made on the control group showed that there was no improvement but rather, the lesions continued to grow. This shows that when lesions of *D. congolensis* infection are left untreated, they continue to grow resulting in ill health and skin damage on the affected animal.

Conclusion

In conclusion, the use of the cream ointment produced from *T. vogelii* in this study produced a good healing effect without problem, showing that *T. vogelii* is an effective topical herbal medicament for bovine dermatophilosis. The result in this study also shows that the plant could present a very good therapeutic option for the in the treatment of *D. congolensis* infection in both cattle and other susceptible animals.

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