

Article

Evaluation of Topicure® Plus spray on sheep infested with Myiasis

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Abstract: The present study was designed to evaluate the therapeutic efficacy of polyherbal aerosol spray - Topicure® Plus against maggot infested wounds in sheep. Two sheep presented at Vellore Veterinary Dispensary with a history of maggot infested wound were selected. Based on the severity of wound, antibiotics (Ampicillin - 10 mg/kg body weight) and NSAIDs (Meloxicam - 0.5 mg/kg body weight on 1st day) were administered. The site of wound was clipped off the hair and cleaned with sterile saline solution and wiped with dry sterile cotton on first day of the treatment. Then Topicure® Plus was sprayed in sufficient quantities to cover the entire wound twice daily till complete healing of wound occurs. When Topicure® Plus spray was administered concurrent local treatment with other fly repellents/maggotocidal agents was not followed. Wound was observed for the changes in swelling, discharge, granulation tissue and wound healing process following the treatment till complete recovery. Similarly, fly repellent activity and duration, maggot repellent property, activity level and product satisfaction score were also recorded. The results indicate that Topicure® Plus had ensured faster wound healing (within 8 days) which is evident through reduction in pain, swelling, discharge and granulation tissue score along with superior fly repellent activity and duration, maggot repellent property. Therefore, it appears from the present study that treatment of myiasis wound with Topicure® Plus spray along with antibiotic regime was the most effective in field conditions as it avoids the day to day manual removal of maggots and induces the faster wound healing.

Keywords: myiasis; polyherbal topical aerosol spray; Topicure® Plus spray

1. Introduction

Small ruminants such as sheep and goat are one of the major sources of protein next to the poultry and play a major role in socioeconomic lives of people in India. However, wounds caused by diseases like PPR, external parasitic infestations and skin infection, reduced the productivity, increased the mortality and affect the quality of hides (McKelvie *et al.*, 1993) as well. Oestridae infestation affect the livestock production which causes abortion, reduces milk production, losses in weight and fertility, poor hide quality and an impairment of the host's immune system that results in severe economic losses worldwide (Otranto *et al.*, 2004). Wounds that are commonly encountered in farm animals, is simply defined as a loss or breaking of cellular and anatomic or functional continuity of living tissue. If the wound is not treated within first 6 hours (also called as 'golden period'), animal could develop infection in an open wound that inhibits all stages of wound healing, even with the best possible local care thereafter, thereby delays the wound healing process. Myiasis is one of the common ecto-parasitic infestation and the host prone is cattle followed by dogs, humans, pigs, horses and sheep (Sergio *et al.*, 2007). In addition, females are more susceptible than males and the most affected area is the navel, vulva, scrotum and shoulder area (Patil, 2014).

Myiasis occurs when flies lay their eggs on the moist wound and the eggs hatch into a tiny larvae or maggots which feed on the tissues until they pupate. A maggot infested wound can be differentiated from normal wound by continuous oozing of pus, plasma and blood and falling of larva leaving the wound always sticky, smelly and blood stained. These inflamed oozing type of wound attracts more flies which results in intense dermatitis and become contaminated with bacteria or feces (Obanda *et al.*, 2013), and further causes inflammation, secondary bacterial complications and fever. Untreated maggot infested wounds, depending on the location of the infestation and the size and condition of animals could result in emaciation, malaise that reduces the fitness and efficiency of animals (Juyena *et al.*, 2013) which eventually lead to death of the animal.

The management of myiasis in animals has been an example for successful approach in controlling the ectoparasites, yet in some cases it requires a modern approach to completely get rid of. Because of the high toxicities and cost of allopathic drugs along with the health risk to humans, it is imperative to evaluate the herbal preparations for management of myiasis. The most commonly followed traditional treatment is the application of turpentine oil, neem oil, camphor or other antibacterial or vermifugal agents that are highly irritant to the animals. Various studies are being conducted to evolve highly effective preparations. Thus, the purpose of present trial is to study the treatment efficacy and fly repellent, maggoticidal/maggot repellent activity of investigational, broad spectrum herbal formulation Topicure[®] Plus spray on myiasis in sheep following topical application.

2. Materials and methods

2.1. Animal management and housing

Animals were managed by the farmer and housed under standard conditions at farmer's place. The regular feed (concentrated feed and grasses) being offered and feeding schedule being followed by the farmer was followed throughout the study.

2.2. Experimental animals

Two myiasis affected sheep (one male and one female) brought to the Veterinary Dispensary of Vellore district, Tamilnadu were investigated in the present study.

2.3. Diagnosis of myiasis

Diagnosis was made based on wound history, close examination of wound, characteristic odor, and brownish exudation from the wound and demonstration of maggots (Blood and Henderson, 1983).

2.4. Treatment of myiasis

The maggot infested wound was cleaned with potassium permanganate solution and wiped with dry sterile cotton. Then Topicure[®] Plus was sprayed twice daily till complete healing of wound occurs. When Topicure[®] Plus was sprayed on wounds concurrent local treatment with other fly repellents/maggotocidal agents was not followed. Based on the severity of wound, antibiotics (Ampicillin 10 mg/kg body weight) and NSAIDs (Meloxicam (0.5 mg/kg body weight on 1st day)) was administered.

The responses to the treatment were assessed based on clinical improvement and time required for wound healing. The wound healing *i.e.*, percentage reduction in wound area and wound depth, pus discharge, redness, swelling, pain, granulation tissue formation, scar formation, fly repellent activity, duration of fly repellent property, activity level and product satisfaction were assessed by the Veterinarian using grading systems as shown in Table 1.

2.5. Topicure[®] Plus

Manufactured by Natural Remedies Private Limited, Bangalore, India.

Composition	%w/w
<i>Pinus longifolia</i> exudate oil	24.53%
<i>Eucalyptus globulus</i> leaf oil	4.65%
<i>Pongamia glabra</i> seed oil	3.41%
<i>Cedrus deodara</i> bark oil	2.18%
<i>Ocimum sanctum</i> leaf oil	1.36%
Excipients	q.s
Coloring agent	Curcumin

2.6. Statistical analysis

The data are expressed as Mean.

3. Results

3.1. Pain score

The treatment of maggot infested wound by Topicure[®] Plus spray ameliorated the pain completely on day 5 (Table 2).

3.2. Swelling score

Swelling of maggot infested wound was completely reduced in Topicure[®] Plus spray administered sheep on day 5 (Table 2).

3.3. Discharge score

Discharge of maggot infested wound was completely stopped in Topicure[®] Plus spray treatment animals on day 7 (Table 2).

3.4. Granulation tissue score

Maturation of granulation tissue in maggot infested wound was observed as early as on day 7 in Topicure[®] Plus spray treated animals (Table 2).

3.5. Wound healing score

Topicure[®] Plus treatment showed a 100% healing of maggot infested wound on day 7 (Table 2).

3.6. Fly repellent activity, fly repellent duration and maggot repellent property score

Topicure[®] Plus spray treatment displayed an excellent (4.00) fly repellent activity and fly repellent duration score, and a moderate (3.00) maggot repellent property score shown in Table 3.

3.7. Activity level and product performance / satisfaction score

Activity level score was 3.00 and the product performance/satisfaction score of Topicure[®] Plus spray was 4.00 suggesting that the users were satisfied with the use of Topicure[®] Plus spray in sheep infested with myiasis (Table 3).

4. Discussion

Sheep (n=2) infested with maggots were selected and treated with Topicure[®] Plus spray twice a day till complete recovery from the infestation. Wounds were observed for the changes in pain, swelling, discharge, granulation tissue and wound healing following the treatment. Similarly, fly repellent activity, fly repellent duration, maggot repellent property, activity level and product satisfaction score were also recorded.

The Veterinarian found the product performs satisfactorily against treatment of myiasis that is reflected in terms of product satisfaction score. The time required in days for complete recovery of animals was on an average of six to seven days following topical application with Topicure[®] Plus spray along with antibiotic treatment.

Topicure[®] Plus spray is the combination of essential oils of *Pinus longifolia* exudate oil, *Eucalyptus globulus* leaf oil, *Pongamia glabra* seed oil, *Cedrus deodara* bark oil and *Ocimum sanctum* leaf oil.

Linolenic acids present in *O. sanctum* fixed oil (Gopinath *et al.*, 2011), eugenol from tulasi oil (Thakur and Pitre, 2009) and 1, 8-cineol (Eucalyptol) from eucalyptus oil (Juergens *et al.*, 2003) have the capacity to block the cyclooxygenase pathway and could be responsible for the anti-inflammatory activity of the oil. *Pongamia glabra* seed oil, the ethanolic extract (Karanjin) seed exhibited an anti-inflammatory effect in chemically induced anti-inflammatory rat, anti-plasmodial, anti-bacterial and anti-viral activities (Sathish Kumar, 2011). Ruprah *et al.* (1980) had reported that use of *Cedrus deodara* had completely cured mange infestation in 17 days in buffalo calves. The essential oil of the leaves of *E. globulus* showed antimicrobial activity against gram negative bacteria (*E. coli*) as well as gram positive bacteria (*S. aureus*) indicates that the essential oil of *E. globulus* leaves might be exploited as natural antibiotic for the treatment of several infectious diseases caused by these two germs (Bachir and Benali, 2012). The pine oil (*Pinus longifolia*) has more or less same repellent action as that was observed with aromatic oil from Citronella (Lemon grass), which is used as insect repellent in some commercial preparations (Ansari *et al.*, 2005). Based on the above results, it was clearly demonstrated that the wound healing and pain relieving effects of Topicure[®] Plus spray observed in the present study could be attributed to the activity of these phytoactive compounds.

Table 1. Grading system.

Criteria	Description	Score
Pain	No pain	3
	Mild to moderate	2
	Severe	1
Swelling	No swelling	3
	Mild to moderate	2
	Severe	1
Discharge	No discharge	5
	Serosanguinous (watery, clear, pink)	4
	Serous (watery, clear, straw colored)	3
	Purulent (thick, yellow, grey)	2
	Hemopurulent (viscous, blood stained)	1
Granulation tissue	Red or pink with glistening surface	4
	Friable, bleeds easily	3
	Mild granulation tissue	2
	No granulation tissue	1
Wound healing (% Reduction in wound area & wound depth)	100% (Wound is completely healed)	5
	75% (3/4 th of wound is healed)	4
	50% (2/4 th of wound is healed)	3
	25% (1/4 th of wound is healed)	2
	< 10% (No signs of healing)	1
Fly repellent activity	Excellent	4
	Moderate	3
	Mild	2
	No	1
Fly repellent duration	Excellent (> 4 hr)	4
	Moderate (2 - 4hr)	3
	Mild (30 min – 2 hr)	2
	Negligible (< 30 min)	1
Activity level	Normal - active and alert	3
	Dull and depressed	2
	Sluggish and lethargy	1
Maggot repellent property	Excellent	4
	Moderate	3
	Mild	2
	None	1
Product performance/satisfaction score	Highly satisfied	4
	Moderately satisfied	3
	Neither satisfied nor unsatisfied	2
	Not satisfied (No relief)	1

Table 2. Effect of Topicure® Plus spray in sheep infested with Myiasis.

	Maggot wound + Standard treatment and Topicure® Plus							
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Pain score	1.00	1.50	2.00	2.50	3.00	3.00	3.00	3.00
Swelling score	1.00	1.00	2.00	2.00	3.00	3.00	3.00	3.00
Discharge score	1.00	1.50	2.00	3.50	3.50	4.50	5.00	5.00
Granulation tissue score	1.00	1.00	2.00	2.50	3.50	3.50	4.00	4.00
Wound healing score	1.00	1.50	2.00	3.00	3.50	4.50	5.00	5.00

Values are expressed as Mean.

Table 3. Effect of Topicure® Plus spray on fly repellent activity, fly repellent duration, activity level and maggot repellent property score of maggot infested wound.

Group	Parameter score				
	Fly repellent activity	Fly repellent duration	Activity level	Maggot repellent Property	Product satisfaction
Maggot Infested Wound + Standard Treatment and Topicure® Plus	4.00	4.00	3.00	3.00	4.00

Standard Treatment - Ampicillin (10 mg/kg body weight) and Meloxicam (0.5 mg/kg body weight on 1st day)

5. Conclusions

The topical polyherbal aerosol formulation Topicure® Plus spray as a supportive therapy along with antibiotic treatment could be effective for the treatment of maggot infested wound in small ruminants as regarded from a significant improvement in wound healing. The Veterinarian involved in this study were found satisfied with the performance of the Topicure® Plus spray as it requires on an average six to seven days of treatment for complete recovery. Hence it appears from the present study that treatment of myiasis with Topicure® Plus spray along with antibiotic regime was effective in field conditions.

Conflict of interest

None to declare.

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