



Maggotocidal and Wound Healing Activity of Herbal Topical Gel in Clinical Cases of Cattle

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ABSTRACT

Wound treatment and healing always remain a concern for the animal health care professionals. Due to emergence of antibiotic resistance and downstream residue in food traditional wound healing medicine is being revisited for safe wound care and management. For this maggoted wound of FMD lesions and laceration alongwith other kinds of wounds were treated with topical herbal gel AV/AAG/12 (Supplied by M/s Ayurved Ltd, Baddi, HP; India). The clinical study was conducted at C. V. Sc & A.H., R. K. Nagar, of Tripura state. Total thirty (n=30) animals were presented for treatment out of which there were 5 cases of laceration myiasis, 6 cases of FMD myiasis, surgical wound (10), 2 cases each of otitis, incision, dog bite and 1 case each of abscess, pustule, mandible edema, mange and foot rot. Clinical examination of animals, biochemical profile and bacteriology was done before and after treatment with AV/AAG/12 gel. All maggoted wounds were cleared of maggots and there was normalization of the physiological and biochemical parameters viz serum protein, albumin-globulin ratio. Bacterial count at higher ranges was significantly reduced. It was proved that AV/AAG/12 gel formulation has got potential wound healing activity for both the types of wounds.

Keywords : AV/AAG/12, wounds, *Pongamia pinnata*, *Ricinus communis*, herbal

1. INTRODUCTION

Wound is defined simply as the disruption of the cellular and anatomic continuity of a tissue (Bennet, 1988) may be produced by physical, chemical, thermal, microbial or immunological insult (Rajinder *et al*, 2008). Wound healing is a complex series of interrelated events that are mediated through the phases by a wide range of chemically coordinated cellular processes as well as hormonal influences (Chan *et al*, 2008). Current methods used to treat wounds include debridement, irrigation, antibiotics, tissue grafts, proteolytic enzymes and corticosteroids which possess major drawbacks and unwanted side effects (Nayak *et al*, 2010). Several drugs obtained from plant sources are known to increase the healing of different types of wounds (Biswas and Mukherjee, 2003). Kumar *et al*. (1999) and Biswas and Mukherjee (2003) reported that about 163 species of plants were used as wound healing plants in Indian systems of medicine such as Ayurveda, Siddha, Unani and folk medicine. Mainly due to the content of flavonoids and tannins, herbal extracts are local modulators of the cellular response, supporting the wound-healing process by their biostimulator, epithelizing and cicatrizing effect (Mogosanu *et al*, 2013). The growing popularity of natural and herbal medications, easy availability of raw materials, cost-effectiveness and paucity of reported adverse reaction, prompted to formulate a polyherbal topical preparation and assess its wound healing ability. Thus in this trial in order to assess the combined efficacy of a polyherbal combination product AV/AAG/12 topical gel which has *Pongamia pinnata*, *Ricinus communis*, *Azadirachta indica* oils as chief ingredients was used to treat the skin condition like mange, septic as well as aseptic wounds.

2. MATERIAL AND METHODS

Present study was conducted by C. V. Sc & A.H., R. K. Na-

gar, on local non-descript cattles of surrounding villages of R. K. Nagar, of Tripura state. Total thirty (n=30) animals of FMD myiasis (6), laceration myiasis (5), surgical wound (8), otitis (2), dog bite (2), incision (2), abscess (1), mange (1), foot rot (1), mandible edema (1) and pustules (1). Record of site of wound, type of wound and lesion was done. Clinical observation of animals e.g. heart beat, respiration rate, rectal temperature, behavioral change, mobility and seclusion were recorded. All the wounds and skin affections were treated with AV/AAG/12 (Supplied by M/s Ayurved Ltd, Baddi, HP; India) topical gel. Wound healing action was determined on the basis of bacterial count from wound exudate, blood serum protein, albumin-globulin ratio. The gross physical appearance of the granulating wounds and the status of healing were recorded as per the method of Kumar (1999) on 0-3 scale as swelling (0-3), exudation (0-3), warmth (0-2), pain (0-2). Record of % wound contraction, time taken for recovery of lesion, time taken for complete healing of wound, number of applications required, larvicidal action of test products was done.

3. RESULTS AND DISCUSSION

Overall results of the clinical trial have been summarized in the table 1.

Laceration myiasis

5 cases of laceration myiasis were presented with wound on shoulder, left hind limb, right mandible, left flank, below left horn, abdomen and right flank. Average time taken for recovery of wound after treatment with AV/AAG/12 gel was 6.8 days while for complete recovery it required 15.4 days. Bacterial count (cfu/cm²) significantly reduced to 153.8 from 294600 after treatment with AV/AAG/12 gel. Physiological and biochemical parameter after treatment values were significantly normalized in treated animals.

FMD myiasis

6 cases of FMD myiasis at interdigital space were treated with AV/AAG/12 gel. Average time taken for recovery of wound 4.84 days and 17.5 days for complete healing. Recovery was confirmed from bacterial count (cfu/cm²) which significantly reduced to 105.16 from 17000 after treatment. Similarly physiological and biochemical parameter (table 1) values were significantly normalized in treated animals. The findings in the present study are in corroboration with the earlier study where use of oils of *Pongamia pinnata* and *Azadirachta indica* are mentioned for healing FMD wound and controlling maggots (Singh & Misri, 2006 and Subrahmanyeswari & Chander, 2013).

Surgical wound

8 cases of surgical wound were treated with AV/AAG/12. Sites of wound were humerus, scrotum, right tibia, neck, thigh, abdomen, left flank. Average time taken for recovery of wound was 3.5 days and 8.0 days for complete wound healing. Recovery was confirmed from bacterial count (cfu/cm²) which significantly reduced to 160.12 from 3277.25 (table 1). After AV/AAG/12 treatment complete healing with scar formation was achieved in 8 days which agrees with reports that herbal ingredients like neem oil has the ability to heal wounds (Kareru *et al.*, 2010; Biswas *et al.*, 2002).

Otitis

Site of wound was right ear scapha and left ear pinna scapha. 2 cases of otitis were treated with AV/AAG/12 and required 3 days for recovery and 7 days for complete healing. Use of *Pongamia pinnata* as potential anti-inflammatory agent for use in the treatment of acute, sub acute and chronic models of inflammation (Srinivasan *et al.*, 2001, Porwal *et al.*, 2010) as analgesic and antipyretic (Srinivasan *et al.*, 2003) has been documented earlier.

Abscess

1 case of abscess at udder was treated with AV/AAG/12 and required 4 days for recovery and 8 days for complete healing of wound. Bacterial count (cfu/cm²) in this case was 18400 which was significantly reduced to 92.5 suggestive of potent antibacterial activity of the herbal ingredients. Wound created by surgical drainage of abscess after irrigation with crude neem oil resulted in a complete healing after seven days without systemic or topical application of antibiotics (Bwala *et al.*, 2011). Effective use of *Azadirachta indica* (Neem oil) for treating wound has been mentioned earlier (Shafiuddin *et al.*, 2009, Bhardwaj & Sharma, 1997).

Dog Bite

2 cases of cattle bitten by dogs at muzzle, rump, left thigh rear, neck were treated with AV/AAG/12 and required 3.5 days for recovery of wound and 15.5 days for complete healing. Bacterial count (cfu/cm²) which was 400 initially after treatment reduced to 110. The results in this study are

in close resemblance to another study where anti-microbial activity and wound contraction studies of other herbal formulation containing *Azadirachta indica* was studied. In it the rate of wound contraction was found to reach a maximum on the 12th day in the treated groups (Bhat *et al.*, 2007).

Mange

Site of affliction was left peri-orbital area. Only 1 case was reported during the trials and it was treated with AV/AAG/12. Average time taken for recovery of wound was 12 days and 17.5 days for complete healing. Use of *Pongamia pinnata* oil for effective treatment of mange was done earlier with significant findings. (Ansari *et al.*, 1997., Thakur *et al.*, 1997., Latasana Devi *et al.*, 1997., Sharma *et al.*, 1995., Pathak *et al.*, 1995., Gahlot *et al.*, 1995., Khurana *et al.*, 1994., Sangwan *et al.*, 1994).

Foot Rot

Only 1 case was reported during the trials and it was treated with AV/AAG/12. Average time taken for recovery of wound was 8 days and 10 days for complete healing. Bacterial count (cfu/cm²) before treatment (9800) with AV/AAG/12 gel was significantly reduced (478). AV/AAG/12 herbal gel contains *Pongamia pinnata*, *Azadirachta indica*, *Ricinus communis* which has a very potent antibacterial activity (Dhanalakshmi *et al.*, 2013). The antimicrobial activities of *Ricinus communis* were good against dermatophytic and pathogenic bacterial strains *Streptococcus pyogenes*, *Staphylococcus aureus* as well as *Klebsiella Pneumoniae*, *Escherichia coli* (Jena & Gupta, 2012). In another study *Ricinus communis* exhibited maximum antimicrobial activity against *Staphylococcus aureus*, *B subtilis*, *P aeruginosa*, *K Pneumoniae* (Naz and Bano, 2012).

Incision wound

1 case with wound below left horn was reported during the trials and it was treated with AV/AAG/12. Average time for recovery of wound as 3 days and 7 days for complete healing. An indigenous formulation containing, (Neem oil) was used for treatment of incision wound in rat model where significant increase in tensile strength (p<0.001) of the wounded tissue was observed (Shafiuddin *et al.*, 2009). The *Ricinus communis* also possess wound healing activity due to the active constituent of it (Jena & Gupta, 2012).

Mandible edema & Pustule

1 case each of mandible edema & pustule were treated with AV/AAG/12. Average time taken for recovery of wound & for complete healing was 3.5-4 days. This is in accordance where the poly-herbal formulation containing *Pongamia pinnata* caused a significant (P < 0.05) reduction in the formaldehyde induced paw edema within a week (Bansod *et al.*, 2010). After treatment all physiological parameters of animals were normalized alongwith biochemical parameters viz serum protein, albumin-globulin ratio.

Table 1: Details of the clinical cases, type of wound, physiological parameters, bacterial count, biochemical parameters

Sr no	Type of wound	No of Cases	Avg no of appli/case	Avg Time for recovery per case (Days)	Avg Time taken for complete healing/case (days)	Bacterial Count (cfu/cm ²)		Serum protein		A/G ratio	
						BT	AT	BT	AT	BT	AT
1.	Laceration myiasis	05	14.8	6.8	15.4	294600	153.8	7.02	7.124	1.06	1.16
2.	Surgical wound	08	6.86	3.5	8	3277.25	160.125	7.08	7.0225	0.99	1.165
3.	FMD myiasis	06	10.84	4.84	17.5	17000	105.16	7.27	7.21	1.06	1.143
4.	Otitis	02	17	3	7	387500	106	7.15	7.3	1.15	1.115
5.	Abscess	01	8	4	8	18400	92.5	6.8	6.9	0.8	1.03
6.	Dog bite	02	9	3.5	15.5	400	110	6.85	6.55	1.26	1.26
7.	Mange	1	24	12	17.5	750	115	7.1	7.1	0.9	0.86
8.	Foot rot	1	12	8	10	9800	478	7.09	7	1	1.05
9.	Incision	02	06	3	7	76500	136.5	6.935	7.06	1.05	1.015
10.	Mandible edema	01	02	02	03	450	105	7.0	6.9	0.84	0.56
11.	Pustules	01	10	05	05	230000	89	7.1	6.7	1.0	0.9

4. CONCLUSION

AV/AAG/12 was used successively as treatment for the laceration myiasis, FMD myiasis, surgical wound, otitis, incision, dog bite, abscess, pustule, mandible edema, mange and foot rot. Its efficacy was proved in terms of maggotocidal, antibacterial activity for rapid healing of wounds. In the end the product was found to be safe, non toxic and free of residual and resistance properties.

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