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Clinical Article

EFFICACY OF DIFFERENT THERAPEUTIC REGIMES ON WOUND MYIASIS IN CATTLE- A CLINICAL STUDY

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SUMMARY

The study was conducted to determine the efficacy of subcutaneous and oral administration of ivermectin, local application of povidone iodine and oil of turpentine in the treatment of natural occurring wound myiasis in cattle. Twenty four naturally affected cattle were randomly divided into four groups of six animals each. Group I was administered with ivermectin injection @ 0.2 mg/kg body weight subcutaneously single dose, whereas Group II was administered ivermectin bolus @ 0.2 mg/kg body weight orally single dose. Group III and IV were treated locally with gauze dipped in povidone iodine and oil of turpentine, respectively on alternate days for five occasions. Streptopenicillin to guard secondary bacterial infection; NSAID, meloxicam to relieve pain were given along with multi-action skin spray (*Cedrus deodara* oil and *Pongamia glabra* oil) locally on the affected area thrice a day until complete healing of the wound for all the groups. The oil of turpentine treatment group has highest reduction in wound area and depth followed by the injectable ivermectin group, oral ivermectin group and povidone iodine group.

Keywords: Cattle, Ivermectin, Myiasis, Povidone iodine, Turpentine oil

Myiasis is the infestation of certain fly larvae in open wounds. This usually occurs in animals when an injury or the presence of excretory material makes the wound attractive to insects. Adult flies are attracted to the wound or excrement and lay eggs on the animal, which develops in the tissue (Hall and Wall, 1995). Classification of myiasis is (a) cutaneous myiasis, (b) wound myiasis (c) myiasis of body cavities (Kouam *et al.*, 2017). Wound myiasis is frequently encountered clinical problem by the veterinarian in India (Chhabra and Pathak, 2009). It has been reported among different species including cattle, dogs, pigs, horses and sheep (Singh and Singh, 2016). Vulnerable sites of myiasis in different species of animals are the vagina and perineal region, tail, interdigital space, brisket region, navel, scrotal region, inguinal region, udder, thigh/rump, limb, head region, mouth/gum, nasal, ear and neck region (Imtiaz *et al.*, 2014). Different line of treatments has been suggested including the use of chloroform, ivermectin, tincture iodine, turpentine oil and surgical debridement for a successful recovery. However, to the best of authors' knowledge, there has been no report of the therapeutic regime of myiasis in the north bank of Brahmaputra plain valley of Assam, India. Therefore, the present study was carried out to compare and evaluate different therapeutic regimes for the treatment of wound myiasis in cattle.

Twenty-four naturally wound myiasis affected cattle irrespective of age, sex, breed brought to the Veterinary Clinical Complex, Lakhimpur, College of Veterinary Science and ambulatory clinics at Nowbachia and Gogamukh , North Lakhimpur, Assam, India during March, 2019 to August, 2019 were investigated and were divided into four equal groups with six animals viz. Group I, II, III and IV. The diagnosis was based on the history, clinical examination and presence of the maggots in the wound (Rahman *et al.*, 2009). The selected animals were properly restrained and exposed larvae were manually removed with sterile tissue forceps. Group I was administered with ivermectin injection (Neomec®, Intas Pharmaceuticals) @ 0.2 mg/kg body weight subcutaneously single dose, whereas group II was administered ivermectin tablet (Neomec®, Intas Pharmaceuticals) @ 0.2 mg/kg body weight orally single dose. Group III and IV were treated locally with gauze dipped in povidone-iodine solution (Getadine®, Genpro Health care) and Oil of Turpentine® (Agarwal drugs), respectively on alternate days for five occasions. The gauze was allowed to remain in the wound pocket for five minutes and then the maggots exposed were removed manually in Group III and Group IV. Injection of streptopenicillin (procaine penicillin 300000 units and penicillin G sodium 100000 units/50 kg body weight) and streptomycin sulphate @ 0.5 g/kg body weight; Dicrystiin-S®, ZydusAHL), intramuscularly for 5 days to guard secondary bacterial infection; NSAID, meloxicam (Melonex®, Intas PVT. LTD.) @ 0.3 mg/kg body weight intramuscularly for 3 days to relieve pain were given along with multi-action skin spray containing *Cedrus deodara* oil and *Pongamia glabra* oil (Charmil®, Ayurvet PVT. LTD.) locally on the affected area thrice a day until complete healing of the wound in all the groups.

Treatment efficacy was determined based on the decrease of the wound area and wound depth. The wound area and wound depth was measured with a ruler and expressed. For wound area measurement, the greatest length is multiplied by the perpendicular greatest width and was expressed as cm^2 (Chang *et al.*, 2011). For wound depth measurement, we placed a cotton-tip applicator into the deepest part of the wound bed and the applicator was placed

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against the ruler and was expressed in cm (Morgan, 2020). The animals were examined on two occasions on 7th and 14th day of treatment.

The main objective of the data analysis was to determine the effect of common therapeutic regimes on wound healing, specifically the reduction in the wound area and wound depth. Statistical analysis was carried out using SPSS16.0 software and the significance of differences of group and days based on the reduction of wound area and wound depth.

In group I, which was treated with ivermectin subcutaneous along with other supportive therapy, the wound area was highly significantly reduced on 14th day from wound area on 7th and 0th day (Table 1). The wound depth on the 14th day of treatment was significantly reduced from wound depth on 7th and 0th day (Table 2). For group II, which was treated with ivermectin orally along with other supportive therapy, wound area on the 14th day of treatment was highly significantly reduced from wound area on 7th and 0th day. The wound depth on the 14th day of treatment was, significantly reduced from wound depth on 7th and 0th day (Table 2). Ivermectin is effective against both ectoparasites and endoparasites including the maggots (Talukder *et al*., 2017). Ivermectin release gamma amino butyric acid (GABA) which blocks nerve impulses on the nerve ending through attaching to the receptors and leading death of the mature and immature parasites (Laing *et al.*, 2017). Previously, Rahman *et. al.*, 2009 also reported 90% wound area and 94% wound depth healing with subcutaneous ivermectin simultaneously in myiasis of cattle. In similar line, Patil (2014) reported complete healing of wound myiasis in cattle in nine days with subcutaneous ivermectin along with supportive drugs. In the present work, group II treated with oral ivermectin has less healing in comparison to the group I treated with subcutaneous ivermectin which may be attributed to superior bio availability of subcutaneous ivermectin over the oral route (Sharun *et al*., 2019).

Table 1

Mean± S.E. (cm^2) of reduction in the wound area

Group	Days of treatment		
	0	7	14
I	$5.73^{c} \pm 0.56$	$4.06^{b} \pm 0.50$	$0.80^{a} \pm 0.24$
II	$4.24^{c} \pm 0.55$	$3.42^{b} \pm 0.64$	$0.93^{a} \pm 0.25$
III	$4.68^{c} \pm 0.76$	$3.88^{b} \pm 0.77$	$2.32^{a} \pm 0.39$
IV	$4.98^{c} \pm 0.43$	$3.33^{b} \pm 0.34$	$0.56^{a} \pm 0.11$

^{a,b,c} Dissimilar superscripts indicate highly significant difference at P<0.01 among days and similar superscript indicates no significance difference among group

Table 2

Mean± S.E. (cm) of reduction in the wound depth

Group	Days of treatment		
	0	7	14
I	$0.54^{ab} \pm 0.12$	$0.41^{ab} \pm 0.08$	$0.08^{aa} \pm 0.02$
II	$0.34^{ab} \pm 0.11$	$0.61^{ab} \pm 0.09$	$0.07^{aa} \pm 0.02$
III	$0.63^{bb} \pm 0.04$	$0.58^{bb} \pm 0.04$	$0.30^{ba} \pm 0.03$
IV	$0.55^{ab} \pm 0.09$	$0.47^{ab} \pm 0.08$	$0.06^{aa} \pm 0.01$

^{a,b} Similar superscript indicates non-significant and dissimilar superscript indicates difference among days/group at p<0.05

In group III, which was treated with povidone iodine dipped gauze locally along with other supportive therapy, wound area on the 14th day of treatment highly significantly reduced from wound area on 7th and 0th day. The wound depth on the 14th day of treatment was significantly reduced from wound depth on 7th and 0th day. Iodine is chiefly an antitimicrobial agent. Through an aqueous medium, free iodine is released from the povidone iodine complex and a balance is reached, further free iodine released from the povidone iodine reservoir as iodine-consuming antimicrobial action continues. (Bigliardi *et al*., 2017). In group IV, which was treated with oil of turpentine dipped in gauze locally along with other supportive therapy, the wound area on the14th day of treatment was highly significantly reduced from wound area on 7th and 0th day (Table 1). The wound depth on 14th day of treatment was significantly reduced from wound depth on 7th and 0th day (Table 2). Oil of turpentine is topical asphyxiating agent that act as topical irritant and blocks the larva's respiratory sinuses, and forces larvae, an aerobic organism to come out to the surface in need of oxygen and facilitating their removal (Krejwaski *et al*., 2009). Our findings are in line up with the findings of Rahman *et al*. (2009) and Patil (2014) where similar efficacy was reported for the treatment of myiasis in cattle with oil of turpentine gauze locally along with other supportive drugs.

As a whole, the wound area and wound depth in all the treatment groups on the post treatment observation days were consistently lower. Oil of turpentine treatment group has the lowest mean values of wound depth and wound area on the 14th day, followed by the injectable ivermectin group, oral ivermectin group and povidone iodine group. Therefore, it can be concluded that wound myiasis in cattle can be best managed with just local application of oil of turpentine along with regular dressing and other supportive therapy.

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