Comparative efficacy of homeopathic and allopathic treatments against Foot and Mouth disease in cattle

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ABSTRACT
The study was conducted in crossbred Frieswal bulls (Holstein–Friesian X Sahiwal) during an outbreak of FMD and 24 FMD-affected animals were randomly divided into two groups–homeopathic treatment group and allopathic treatment group–consisting of 14 and 10 animals, respectively. In the homeopathic treatment group were treated with Sulphur 200C @ 20 drops orally once. Kalium iodatum 200C @ 20 drops orally twice a day for 3 days. Calendula mother tincture was used for washing and topical application over the oral and foot lesions. Animals in the allopathic treatment group were treated with intramuscular injections of strepto-penicillin twice a day for 3 days, meloxicam once a day for 3 days along with washing of oral and foot lesions with potassium permanganate (1:1000) followed by topical application of 2% boroglycerine over the oral ulcers. The animals were closely inspected for 12 days for recording clinical signs. The mean rectal temperature in the animals of homeopathic treatment group was significantly (p<0.05) lower than those of the allopathic treatment group on days 2 and 3 post treatment. Appetite score improved significantly (p<0.05) in homeopathic treatment group as compared with allopathic treatment group on day 3 post treatment. Healing scores of oral mucosal lesion were significantly (p<0.05) higher in the homeopathic treatment group than that in the allopathic treatment group on days 2, 3, and 5 post therapy. Healing of foot lesions was significantly (p<0.05) better in the homeopathic treatment group than that in the allopathic treatment group on day 3 and 5 post treatment.

Key words: Cattle, Calendula, Foot-and-Mouth Disease, Homeopathy, Kalium iodatum, Sulphur

INTRODUCTION
Foot-and-mouth disease (FMD) is one of the most contagious viral diseases of the cloven-footed animals and is caused by Aphthovirus of the family Picornaviridae (Radostits et al., 2007). The disease is characterized by fever, salivation, lameness, vesicle and ulcer in mouth, feet, and teat of infected animals and causes high economic loss (Yang et al., 1999; Alexandersen et al., 2003). There is no standard treatment for FMD, supportive treatment including antimicrobial therapy for preventing secondary bacterial infection and antiseptic application over the oral ulcers and foot lesions is recommended. Homeopathy is considered one of the safest methods of animal treatment (Day, 1999). Homeopathic remedies have been used in the management of FMD with encouraging results (Duz et al., 2012; Lotfollahzadeh et al., 2012; Shakoor et al., 2014). The effectiveness of homeopathic drugs, such as Kalium iodatum, Calendula, and Sulphur, in the treatment of ulcer and vesicles in mouth and tongue, bleeding gums, and healing of wounds have been described in humans(Borieck, 1991; Clarke, 1996; Kent, 2000). Kalium iodatum is recommended as a protective agent against FMD in cattle (Clarke, 1996). The antiseptic, antiviral, anti-inflammatory, and wound healing properties of Calendula officinalis have been proved (Rao et al., 1991; Muley et al., 2009; Parente et al., 2012). The present study was conducted to compare the effectiveness of homeopathic and allopathic treatments against naturally FMD-affected cattle.

MATERIALS AND METHODS
The study was conducted during an outbreak of FMD (serotype O) in crossbred Frieswal bulls (Holstein–Friesian X Sahiwal) at an organised bull rearing unit of Military dairy farm, Meerut City, Uttar Pradesh, India. The animals had been vaccinated with Bovilis™Clovax (serotype O, A, Asia1, Intervet India Pvt. Ltd.) in February 2015. FMD was diagnosed based on history and typical clinical signs like fever, salivation, ulcers on the tongue, gums, dental pad, and hooves (coronet and interdigital space). Confirmation and serotyping of the causative agent was performed by Enzyme Linked Immunosorbtent Assay (ELISA) (Longjam et al., 2011) and polymerase chain reaction (PCR) (Longjam et al., 2011) in serum and tissue samples from infected animals at ICAR- Project Directorate on FMD, Mukteshwar, Uttarakhand, India. A total of 24 FMD affected animals were selected and randomly divided into two groups–homeopathic treatment group and allopathic treatment group–consisting of 14 and 10 animals, respectively. All the animals included in the study were showing clinical signs of FMD since 1-2 days (Fig 1 and 2).

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Animals in the homeopathic treatment group were treated with homeopathic medicines consisting of Sulphur 200C (Dr Willmar Schwabe India Pvt Ltd, Noida, India) @ 20 drops orally once, Kalium iodatum 200C (Dr Willmar Schwabe India Pvt Ltd, Noida, India) @ 20 drops orally twice a day for 3 days. Calendula mother tincture (Dr Willmar Schwabe India Pvt Ltd, Noida, India) was diluted to 1:200 with distilled water for cleaning of mouth and foot ulcers. A Calendula solution was prepared by diluting mother tincture (5 drops in 5 ml of distilled water) for dressing and topical application over the foot and mouth lesions. Animals in the allopathic treatment group were treated with intramuscular injection of antibiotics- streptomycin and penicillin combination (10 mg streptomycin/kg b. wt., 10000 IU penicillin/kg b. wt., Dicrysticin®, procaine penicillin 15 lac, Pencillin G sodium 5 lac, streptomycin sulphate 2.5 g/vial; Sarabhai Zydus Ltd.) twice a day for 3 days, meloxicam (0.5 mg/kg b. wt., Melonex®, 5 mg/ml; Intas Pvt. Ltd.) once a day for 3 days along with washing of oral mucosal and foot lesions with potassium permanganate (1:1000) followed by topical application of 2% boroglycerine over the oral ulcers and Betadine® spray on the foot lesions.

The animals of the two groups were closely observed pre (day 0) and post (days 1, 2, 3, 5, and 12) treatment for recording clinical parameters including rectal temperature and heart and respiratory rates. Scores for appetite, rumen motility, and oral and foot lesions were recorded as per method described (Lotfollahzadeh et al., 2012). Therapeutic efficacy of the two treatments was judged on the basis of clinical recovery of animals in terms of above mentioned parameters. The mean values of temperature and heart and respiratory rates were statistically analysed using the student t-test to determine significant inter-group differences at different observation days. Median values of scores of appetite, oral mucosal lesions, foot lesions, and ruminal motility were analysed using the Mann–Whitney U test to find out inter-group significant differences. Values of p<0.05 were considered significant.

RESULTS AND DISCUSSION

The FMD-affected animals showed loss of appetite, fever, salivation, vesicles and ulcers over the tongue, gums, dental pad and lameness because of lesions in the coronet and interdigital space of hooves. Sandwich ELISA and multiplex PCR of the tissue samples of infected animals revealed the serotype O of FMD virus in this outbreak. In addition, serological examination of the affected bulls by r3AB NSP ELISA (DIVA) showed anti 3AB3 NSP antibody response suggesting exposure to FMD virus.

Mean rectal temperature, heart and respiratory rates and median scores of appetite, oral lesion, rumen motility, and foot lesion in FMD-affected animals pre and post treatment are presented in Table (1) & (2). The pretreatment clinical signs and scores of appetite, rumen motility, oral and foot lesions of the animals in both groups were not significantly different (Table (1) & (2)). Mean rectal temperature in the homeopathic treatment group was significantly lower (p<0.05) than that in the allopathic treatment group on days 2 and 3 however, temperature differences between these groups on days 5 and 12 were not statistically significant (Table - 1). Mean heart rates of the animals were not significantly different in the two groups during the entire observation period post treatment. Respiratory rate in the homeopathic treatment group was significantly lower (p<0.05) than that in the allopathic treatment group on days 2 and 3 however, temperature differences between these groups on days 5 and 12 were not statistically significant (Table - 1). Mean heart rates of the animals were not significantly different in the two groups during the entire observation period post treatment. Respiratory rate in the homeopathic treatment group was significantly (p<0.05) lower than that in the allopathic treatment group during first 3 days of treatment, whereas it was not significantly different on days 5 and 12 in both treatment groups (Table - 1). Appetite in the homeopathic treatment group improved significantly (p<0.05) on day 3 as compared to that in the allopathic treatment group (Table - 2). Rumen motility was significantly higher (p<0.05) in the homeopathic treatment group than that in the allopathic treatment group on days 2 and 3 (Table - 2). Healing of

Fig 1: Severe ulcers in the mouth of FMD affected animal

Fig 2: Severe ulcers in the hoof of FMD affected animal
mucosal lesions in the homeopathic treatment group was significantly better than that in the allopathic treatment group (Fig. 3). Healing scores in the homeopathic treatment group were significantly higher (p < 0.05) than those of the allopathic treatment group on day 2, 3, and 5 (Table 2). Significant difference (p<0.05) in the foot lesion score was observed in both the treatment groups at day 3 and 5 (Table 2). Healing of the foot lesions was significantly (p<0.05) better in the homeopathically treated animals as compared to the allopathic treatment group (Fig. 4).

FMD is one of the most important diseases causing significant economic loss in the Indian livestock sector. Beside production loss, it affects international trade of livestock and their products causing additional economic loss to the endemic countries. Although the animals were vaccinated with Bovi-S™ Clovax® against FMD but the animals were affected because of continuous mutation and formation of new strains within the virus serotype (Della-Porta, 1983). In this study, compared to the allopathic drugs, treatment of FMD-affected animals with homeopathic drugs led to better recovery of animals in terms of reduced temperature, improved appetite, and enhanced healing of oral and foot lesions. The precise

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**Table 1:** Mean values of temperature (°C), heart rate and respiration rate in FMD infected animals before and after treatment (Mean± S.E.M.).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Groups</th>
<th>Days post therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Temperature</td>
<td>A</td>
<td>39.6±0.2</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>39.8±0.2</td>
</tr>
<tr>
<td>Heart rate</td>
<td>A</td>
<td>86.4±2.0</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>90.6±1.6</td>
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<tr>
<td>Respiration rate</td>
<td>A</td>
<td>42.1±1.8</td>
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<td></td>
<td>B</td>
<td>42.2±1.3</td>
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Observations with * in a column are significantly different (p<0.05) between treatment groups. Gr. A- Homeopathic treatment (n=14), Gr. B- Allopathic treatment (n=10)

**Table 2:** Median values of scores of appetite, oral lesion, rumen motility and Foot lesion in FMD infected animals before and after treatment [Median (Range)].

<table>
<thead>
<tr>
<th>Parameters</th>
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<th>Days post therapy</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Appetite score</td>
<td>A</td>
<td>1.5(1-2)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1(1-2)</td>
</tr>
<tr>
<td>Oral lesion score</td>
<td>A</td>
<td>1.5(1-2)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1(1-2)</td>
</tr>
<tr>
<td>Rumen motility score</td>
<td>A</td>
<td>1(0-2)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1(1-2)</td>
</tr>
<tr>
<td>Foot lesion score</td>
<td>A</td>
<td>1(1-2)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1(1-2)</td>
</tr>
</tbody>
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Observations with * in a column are significantly different (p<0.05) between treatment groups. Gr. A- Homeopathic treatment (n=14), Gr. B- Allopathic treatment (n=10)

Appetite score-Anorexia-1, inappetance-2, normal appetite-3
Rumen motility score- No ruminal contraction-0, 1 ruminal contraction in 2 min.- 1, 2 ruminal contraction in 2 min - 2, 3 ruminal contraction in 2 min - 3
Oral & foot lesion score-blister /bulla-1, burst blister with severe hyperemia -2, decreased hyperemia with reepithelialization of lesions - 3, complete healing of lesions-4
response of the body to homeopathic treatment and the mode of action of the medicines in curing a disease is not known. They are believed to stimulate the defense mechanism of the body for countering an existing illness (Day, 1999). Homeopathic medicines are selected according to their toxic or symptomatological effects predominantly in human body. Kalium iodatum was selected based on its homeopathic effects such as vesicles and ulcers on the tongue with burning pain, heavy salivation, redness and swelling of the soft palate, and tonsils that are described in human beings, which are similar to the signs and symptoms of FMD in cattle. Kalium iodatum has been recommended for preventing FMD in cattle (Clarke, 1996). Calendula officinalis used in present study possesses antiseptic, antiviral, anti-inflammatory and wound healing properties (Rao et al., 1991; Muley et al., 2009; Parente et al., 2012). A tincture of the flower suppressed the replication of herpes simplex and influenza viruses in vitro (Bogdnova et al., 1970). The anti-inflammatory response of Calendula officinalis is mediated by triterpenoid esters through inhibition of proinflammatory cytokines, COX-2, and subsequent prostaglandin synthesis (Preethi et al., 2009). The effect of an anti-inflammatory drug is more prominent when it is applied during the inflammatory stage of healing because the mediators of inflammation are required to initiate tissue repair. External application of hydroalcoholic extract of Calendula accelerated the rate of contraction and epithelialisation of excision wounds in rats which are two most important factors in wound healing (Snowden, 1981; Rao et al., 1991). It also promotes granulation and rapid healing (Boericke, 1991; Fronza et al., 2012).  

As Calendula solution was used for washing as well as topical dressing of the lesions in the present study, the anti-inflammatory, antiseptic and rapid wound-healing properties of Calendula officinalis might have hastened the healing of the oral and foot lesions in the homeopathic treatment group (Rao et al., 1991; Muley et al., 2009; Parente et al., 2012). Homeopathic effects of Sulphur on the symptoms of vesicles, pustules and scaly eruptions with discharge and suppuration have been described (Boericke, 1991; Kent, 2000). It also reduces itching and irritation to help relieve various skin conditions (Kent, 2000). Homeopathic medicines such as Theranekron, Echinacea-Q, Belladona, Silicea and Thuja have also been evaluated and found to be effective in the treatment of FMD in cattle and buffalo (Duz et al., 2012; Lotfollahzadeh et al., 2012; Shakoor et al., 2014).

The recovery of the animals in the allopathic treatment group might be ascribed to bactericidal effect of the antibiotic over the lesions, which controlled the secondary bacterial infection resulting in the healing of oral mucosal and foot lesions. The complications of FMD in cattle include secondary bacterial infection of the lesions, development of maggots in foot lesions, hoof sloughing, chronic lameness, decreased production, and weight loss (Shakoor et al., 2014). Because of the unavailability of antiviral drug, antibiotics are administered to prevent secondary bacterial infection and further complications of FMD lesions. However, in the modern context of concerns over antibiotic resistance, developing effective and safer alternatives to antibiotic therapy in viral infections is essential. Homeopathic treatment can overcome the problem of bacterial resistance associated with antibiotic therapy in viral infections.

The present study concludes that homeopathic treatment using Kalium iodatum, Calendula, and Sulphur is effective in reducing temperature, increasing appetite and ruminal motility, and rapid healing of the oral mucosal and foot lesions in FMD-infected cattle and has potential as an alternative treatment for FMD in animals.

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REFERENCES


