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Antibiotic versus no antibiotic approach in the management of lumpy skin disease (LSD) in cattle

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Abstract

Antibiotics do not show effect on infections of solely viral origin. Lumpy Skin Disease is a viral disease where antibiotics are not clinically indicated. Due to monetary worth of high producing animals, Veterinarians are resorting to use antibiotics in LSD as a preventive measure against secondary bacterial infections. Eighteen animals with lumps on the skin were selected and randomly distributed into 3 groups of 6 animals each. Two groups were treated with commonly used broad-spectrum antibiotics and the third group was treated with Neem oil topically over the lesions and were offered fresh Neem leaves smoke. As a result, Lumpy skin disease was treated economically without the inclusion of antibiotics where Neem oil and fresh neem leaves smoke guarded the animals from the risk of secondary bacterial infection. This approach eliminates the risk of antimicrobial resistance, minimises the cost of treatment, and eliminates antibiotic induced undesirable depopulation of rumen microflora.

Keywords: Antibiotic, Antimicrobial resistance, Lumpy Skin Disease, Prevention

Introduction

Lumpy skin disease, a viral disease majorly in cattle which is known to be transmitted by biting insects has shown a surge in incidence rate in India in recent times. LSD is caused by Lumpy skin disease virus; a member of Capri pox virus belongs to *Poxviridae*. It is a notifiable disease having a devastating effect on international livestock trade. Though the mortality is low, the morbidity rates are very high ^[1], and the negative impacts on milk and meat production, hide quality, draft power and reproductive efficiency (abortion and infertility) ^[2] are very prominent in LSD. The disease is characterized by lumps and nodules formation involving the skin, subcutis and occasionally muscularis layer also. The sloughing of skin lesions may create ulceration and lead to the characteristic lesion "sitfast", which may subsequently be invaded by flies and bacteria that can further lead to myiasis and septicaemia ^[1, 3]. Antibiotics are intended for diseases with bacterial origin and antibiotics do not affect infections of solely viral origin ^[4]. LSD being a viral disease, the use of antibiotics is generally not clinically indicated. In India, LSD has emerged recently and spread wide across. Veterinarians are resorting to the use of antibiotics as a preventive measure against secondary bacterial infections and to hasten the recovery in LSD cases. Antibiotic resistance is a natural phenomenon in which bacteria gain the ability to withstand the effect of an antibiotic ^[5]. The constant increase in antibiotic resistance and side-effects of synthetic drugs is concerning animal and human life. Overuse, misuse, and over-prescription of antibiotics lead to antibiotic resistance ^[6]. The therapeutic role of several plants in diseases management is being enthusiastically researched due to their less side effect and affordable properties ^[7]. The phytoconstituents like alkaloids, steroids, tannins, crude glycosides and flavonoids of neem plants were tested which provided a wide spectrum of antibacterial activity ^[8]. Recent research also revealed that Neem extracts exhibit antiviral, anti-fungal, anti-insecticidal and anti-inflammatory properties ^[9, 10]. The present study aims to evaluate alternative, inexpensive and effective means to prevent secondary bacterial infections in LSD as an alternative to antibiotics.

Materials and Methods**History and Clinical Signs**

A herd of around 30 Non-descript cattle in a tribal village of East Godavari District, Andhra

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Pradesh was presented with lumps on the skin of varying sizes, reduced feed intake, mild rise in rectal temperature, swollen pre-scapular and pre-femoral lymph nodes, lameness in few animals, rough skin coat, dry scabs in few. The distant

and close physical examination, symptoms and epidemiological data were suggestive of Lumpy skin disease tentatively in the herd. By the time the herd was presented few lesions were already open, ulcerated and bleeding.



Fig 1 (Left) 2 (Right): Cattle infected with LSD showing open, ulcerated and bleeding lumps of approximately 4-5cm size.



Fig 3: (Left) showing severity of lesions in LSD



Fig 4: (Right) showing swollen and palpable Pre-femoral lymph node



Fig 5: A Bull affected with LSD showing Ventral edema

The Design of the study

Eighteen animals in that herd were selected based on the size

of skin lumps for the study. Animals which showed severe skin lesions i.e., multiple lumps on the skin with more than 3cm diameter lumps were selected and distributed into 3 groups of 6 animals each randomly. Two groups were treated with commonly used broad-spectrum, long-acting antibiotics (Enrofloxacin and Oxytetracycline). Group 1 was treated with Enrofloxacin 200mg@ 5 mg/Kg BW Intramuscular Injection once on day 0 and day 3, Group 2 was treated with Long-acting Oxytetracycline 200mg @ 20mg/Kg BW Deep Intramuscular injection once on day 0 and day 3. The third group was treated with Neem oil topically over the lesions and fresh Neem leave smoke morning and evening daily. All groups were commonly given Injectable B-Complex, Non-steroidal anti-inflammatory (Meloxicam @ 0.5mg/Kg BW I/m QD) and anti-histamine injections (Chlorpheniramine maleate @ 40mg as Total Dose I/m QD) daily for 7days. Sterile needles and syringes were used separately for individual animals. The animals were examined daily for rectal temperature, changes in behaviour, feed and water intake status. The rate and duration of recovery was studied. High Rectal temperature, anorexia and change in behaviour viz., ataxia, respiratory distress, separation from herd et cetera if existed, were taken as criteria for considering the existence of a secondary bacterial infection. Regression of lumps was considered as recovery from the disease.

Blood Sampling

Blood samples were drawn from the jugular vein from individual animals to analyse haematological and serum biochemical profiles of the affected animals for diagnostic purpose.

Results and Discussion

Upon taking daily rectal temperature, majority of the animals showed only a mild rise in the temperature, which subsided upon NSIAD and antihistamine injections. The rectal temperature in the groups varied between 101.6 °f to 103.2 °f. This mild rise in rectal temperature might be due to generalized inflammatory process in the body in response to lumps. Animals in all the groups showed improvement in voluntary feed intake (based on time spent for grazing and activity) from the 3rd day after starting the treatment

protocols. Mortality was not present in any of the groups. The lesions started to regress from 3rd day and showed complete regression by 9-11 days from the day of initiation of treatment in all the groups.

The results of the study indicated that the duration of recovery (based on the rate of regression of lumps) was almost similar in the groups. The findings of group 1 and group 2 were in accordance to the established findings where LSD was successfully managed with 10% Oxytetracycline in a bull and Enrofloxacin in cattle respectively ^[11, 12].

The rate and duration of recovery in Group 3 was comparable to the remaining two groups. Animals recovered without any complications. Neem has wound healing properties, anti-inflammatory property and fly repellent property as per reports ^[10]. In the present study, the antibacterial phyto constituents in Neem oil may have guarded the animals against the intrusion of secondary bacterial infection upon topical application over the lumps. Moreover, fresh neem smoke offered twice daily to the animals in group 3 may have prevented myiasis and also airborne bacterial contaminations as per the proven studies ^[13]. Also, neem oil was proven to offer a wide spectrum of antibacterial activity against gram-positive and gram-negative microorganisms ^[8], promotes wound healing activity through increased inflammatory response and neovascularization^[14] which might have favoured the healing of ulcerated lumps in the present study. The cost of treatment in group 3 was lowest as neem oil and fresh neem leaves were readily and freely available.

Conclusion

The study concludes that,

1. The use of antibiotic is not necessary unless animal shows signs of existence of secondary bacterial infection. Instead, Neem oil could be used to effectively guard the lumps to prevent the risk of secondary bacterial infection.
2. Prescribers may rely on case follow-up and vitals to decide upon the use of antibiotics. With good case follow-up by recording vitals, rectal temperatures and behavioural changes, unnecessary and proactive use of antibiotics can be avoided.
3. Inclusion of antibiotic haven't hastened the recovery period, which justifies that LSD can be treated economically and naturally with neem.

This approach eliminates the risk of antimicrobial resistance, avoids antibiotic residues in meat, milk and in its products, minimises the cost of treatment, and eliminates the risk of antibiotic induced undesirable depopulation of rumen microflora.

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