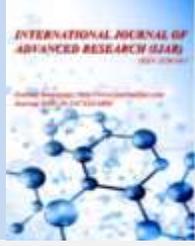


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RESEARCH ARTICLE

THERAPEUTIC MANAGEMENT OF CLINICAL MASTITIS IN GOAT: A CASE STUDY

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Abstract

Clinical mastitis is a common and economically significant disease in dairy animals. A doe with clinical mastitis was brought to the Veterinary Clinical Complex, College of Veterinary Sciences and Animal Husbandry, CAU (I), Jalukie, Nagaland in 2022. The milk sample was collected from the affected teat. Then, the milk sample was cultured, and performed bacterial isolation test as well as an antibiotic susceptibility test (ABST) to check antimicrobial susceptibility. The growth of smooth, mucoid, and circular colonies was found on nutrient agar media and the colonies appeared as gram-positive cocci with gram staining technique. Furthermore, the bacterial isolates were sensitive to Gentamicin, Cefoperazone, and Ceftriaxone. The findings of this study have provided valuable insights for selecting appropriate antibiotic therapy for the effective therapeutic management of mastitis in goats.

Highlights

1. Staphylococcus spp. were isolated from the milk sample of a doe suffering from clinical mastitis.
2. Selection of appropriate antibiotics based on antibiotic susceptibility test (ABST), thus combating potential emergence of resistant bacteria.
3. Optimal supportive care and effective therapeutic management of clinical mastitis in goat.

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Introduction:-

Mastitis has been identified as one of the most expensive and multifactorial diseases resulting in the decrease in milk yield, quantity, and quality, which ultimately leads to drop in the overall milk production and also causes severe economic losses for dairy goat farmers.^{1,2} In general, mastitis occurs either as subclinical, in which there's no visible symptoms, or clinical. Clinical mastitis is characterized by swelling and redness of udder, pain, and reduced and altered milk secretion from the affected quarters and the milk may also contain clots or flakes or become watery in consistency accompanied by fever, depression and anorexia.^{2,3} Subclinical mastitis, if remains untreated, eventually develop into the chronic clinical form of mastitis.^{4,5} Chronic mastitis continues over a long period of time leading to udder fibrosis as a result of bacteria forming colonies and reactions occurring in the mammary tissues.^{6,7} Staphylococcus spp are the most frequently diagnosed causal microorganisms of intramammary infections (IMI) in small ruminants. However, other pathogens such as Streptococcus spp., Enterobacteriaceae, Pseudomonas aeruginosa, Corynebacteria, fungi etc. can also produce mastitis in small ruminants, but occurrence rates are

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lower.⁶Responsible use of antimicrobials, and search for therapeutic alternatives to decrease antimicrobial use (AMU) and antimicrobialresistance (AMR) emergence in dairy products are a priority in veterinary medicine and public health.⁸ Keeping this in view, the present study aimed at diagnosing clinical mastitis (CM), identification of causal agent, treatment aspect and proper selection of antibiotics based on culture sensitivity test.

Materials And Methods:-

Case Presentation

A two-year-old doe (23 kg body weight) with supernumerary teats was presented to the Veterinary Clinical Complex, College of Veterinary Sciences and Animal Husbandry, CAU (I), Jalukie, Nagaland with the complaint of a swollen udder and reduced appetite. Clinical examination of the doe revealed a rectal temperature of 102.5 °F, swelling of the right quarter (Fig-1), warm and tender to touch. Further, fibrosed mass like hardness was felt upon palpation of the udder. Milk was purulent with the presence of clots and flakes (Fig-2). On the basis of history and clinical signs, it was tentatively diagnosed as a chronic clinical mastitis case.



Fig 1: - Swollen right quarter of the doe.



Fig 2: - Purulent milk with flakes and clots.

Collection of samples

Milk sample was collected aseptically from the affected quarter for the microbiological examination and antibiotic sensitivity test (ABST). Whole blood sample was also collected and sent for complete blood count (CBC).

Culture and Identification of Bacteria

Nutrient agar (Himedia, India) was prepared according to the manufacturer's instructions and stored in a refrigerator until use. The milk sample was streaked over nutrient agar (NA) using a sterile bacteriological loop. The plates were

incubated overnight at 37°C and colony morphology was examined. Bacteria from the isolated colonies were stained with Gram's staining technique to differentiate between Gram-positive and Gram-negative bacteria and also to note the microscopic shape of the bacteria.

Antibiotic Susceptibility Test

Antibiotic susceptibility test (ABST) was performed using the disc diffusion method. Mueller Hinton Agar (Himedia) plates were inoculated with standardized inoculums of the test sample. Five commonly used antibiotic discs viz. Ceftriaxone (CTR) 10 mcg, Enrofloxacin (EX) 10 mcg, Gentamicin (GEN) 50 mcg, Ciprofloxacin (CIP) 10 mcg, Streptomycin (S) 25 mcg, Cefoperazone (CPZ) 75 mcg were placed on the agar surface. The plates were incubated at 37°C for 24 hours. The measurement of the inhibition zone was read and compared to the Zone Size Interpretative Chart provided by Himedia.

Results:-

Hematology Profile

Hematological analysis revealed neutrophilic leukocytosis and also a slight decrease in Hb content and packed cell volume. The hematological value of a doe, suffering from mastitis is presented in Table 1.

Table 1:- Hematological analysis.

Hemogram		Differential count	
Hb (8-12)	7.1 g/dl	Neutrophils (30-56)	76.7%
PCV (22-39)	20.1%	Lymphocytes (35-75)	54.6%
RBC (8-18)	12.43 M/mm ³		
WBC (4-13)	30 m/mm ³		
Platelets (200-600)	230 M/mm ³		

Isolation and Identification of Bacteria from Milk Sample

After overnight incubation at 37°C agar plate showed the presence of smooth, mucoid, and circular colonies (Fig-3). Gram's staining method revealed gram positive cocci arranged in the form of clusters under microscopic examination (Fig-4) to be grouped under *Staphylococcus* Spp.



Fig 3:- Bacterial isolates on nutrient agar.

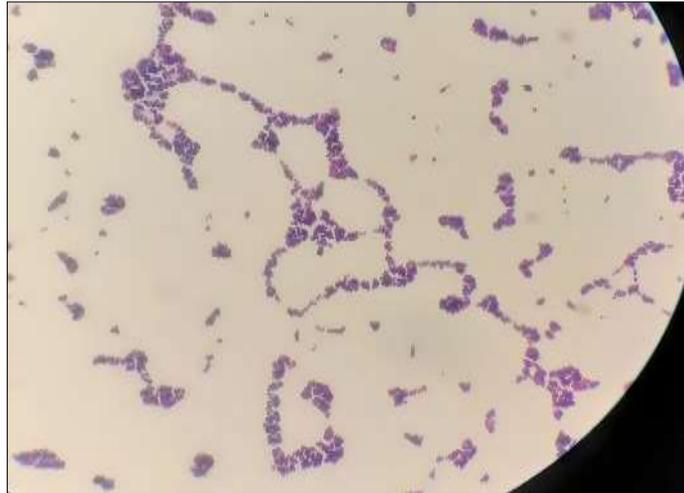


Fig 4:-Gram positive cocci arranged in clusters seen on gram's staining.

Antimicrobial Susceptibility Results

The Antibiotic assay revealed the bacterial isolates to be more sensitive to Gentamicin, Cefoperazone, and Ceftriaxone followed by Streptomycin, Ciprofloxacin, and Enrofloxacin. The results obtained were in correlation with the study done by Kausaret al., and Singh Met al.^{9,10}

Treatment

The doe was treated with Injection Gentamicin (Gentamicin) @4mg/kg b.wt. b.i.d intramuscularly, Mammicef (Cefoperazone) intramammary infusion-10 ml. Other supportive therapy includes fluid therapy with Normal saline and Ringer's lactate infusion @250ml intravenously, Injection Belamyl (B-complex Liver extract Vitamin B12) @2.5 ml intramuscularly. The treatment was continued for 3 days. Injection Isoflud (Isoflupredone), a corticosteroid, was administered @2.5 ml intramuscularly for 6 days consecutively. The doe responded positively to the treatment; significant reduction of the size and hardness of the udder was noticed; the milk consistency has returned to normal, there were no longer any clots or flakes in milk; the animal started taking food.

Discussion:-

Mastitis has been recognized as the most frequent cause of antimicrobial use in dairy animals, which contributes to a substantial portion of total drug and veterinary costs incurred by the dairy industry.¹¹ Consequently, overuse of these antimicrobials becomes a public health concern as it may increase antibiotic resistance and also the possibility of residues in milk. Therefore, judicious and selective use of antibiotics is of foremost importance.^{12,13} However, early instigation of treatment is also important, a) to minimize mammary lesions, b) to restore health of the affected animals, and c) to prevent transmission of the disease to other animals.^{14,15} The purpose of this study is to provide effective and rational therapy with a significant dependence on culture results and antibiotic sensitivity test, thus minimizing the arbitrary use of antimicrobials. In this case study, corticosteroids (Isoflupredone) have been used as a supportive therapy, for Corticosteroids has fibrinolytic properties and check fibrosis in the mammary gland. Isoflupredone has found to be less immunosuppressive compared to other corticosteroids and it is safe in pregnant and lactating animals.¹⁶ Fluid therapy has been advocated in mastitis to flush out all the toxins produced by pathogens. Other control method includes segregation of the affected animals from the flock in order to prevent spread of the disease; complete removal of milk, it flushes out bacteria, debris, and toxins in the teat canal; implementation of appropriate hygiene and management practices for housing, feeding, and milking.

Conclusion:-

In the present study, Staphylococci spp. were the organisms responsible for causing clinical mastitis in the doe and they were found to be highly sensitive to Gentamicin, Cefoperazone and Ceftriaxone on ABST. The complete recovery of the doe was reported in this case study after optimum therapeutic and supportive care. Regardless, prompt and efficient treatment must be implemented for a favorable outcome of mastitis in goat.

Authors Contribution:-

All the authors made a significant contribution to the work reported. A.D made the study conception, execution and acquisition and analysis of the data and R.S did the interpretations. Finally, all the authors read, revised and drafted the manuscript for publication and also gave final approval of the version to be published based on the selected journal to which the article has been submitted.

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Conflicts Of Interest:-

The author reports no conflicts of interest in this research work.

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