THERAPEUTIC MANAGEMENT OF PNEUMONIA IN SHEEP

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ABSTRACT

Fifteen adult sheep showing clinical signs of respiratory distress, nasal discharge (watery to mucous), depression, inappetance to anorexia, high rise in temperature, lacrimation, rough and dull hair coat, divided into three equal groups were successfully treated with three different combinations of treatment. Nasal swabs recorded presence of *E. coli* predominately.

Key words: Therapeutic management, pneumonia, sheep

Introduction

Among diseases of respiratory system, pneumonia appears to rank first particularly in sheep. The occurrence is influenced by many factors viz. region, season, age, management system and immune status. To record the clinical changes in naturally occurring cases in sheep in varying season and to improve the therapeutic management, study was carried out in outgoing cold season, February-March, 2010 on animals maintained at Central Sheep and Wool Research Institute, Avikanagar.

Materials and Methods

A group of fifteen adult sheep of Patanwadi and Malpura breeds, weighing around 25-40 kg was selected after their clinical examination. These animals were further divided into three groups- G I, G II and G III. They were examined daily before and after treatment for recording physiological parameters, clinical signs, changes notable through auscultation. The collected nasal swab samples were subjected to bacterial culture. The bacterial isolates were then inoculated on primary, differential and/or selective media and were characterized by morphological, cultural and biochemical characteristics.

The animals of group G I were treated with treatment regimen T I and G II and G III with treatment regimen T II and T III, respectively. The T I consisted of Amino-glycoside-Amikacin, T II of Fluoroquinolone-Enrofloxocin (Enrocin 10%,Vetnex) and bronchodialators-Etophylline and Theophylline (Deriphyllin) and T III of Synthetic penicillins-Ampicillin plus cloxacillin (AC-VET FORTE, Intas), Aminoglycoside-Amikacin and bronchodialators-Etophylline and Theophylline.

The T I -Amikacin was injected @ 7.5 mg/kg b.wt. 12 hourly. T II Enrofloxacin was injected @ 10 mg/kg b.wt. 12 hourly and bronchodialators 1 ml i/m 12 hourly for two days only. Remaining three days only antibiotic was given with same dose and interval. T III -penicillins were given @ 15 mg/kg b.wt. 6 hourly for 2 days followed by 8 hourly for remaining 3 days and bronchodilators followed the same dose, route and duration as of T II. The treatment schedule was continued for 5 days.

Results and Discussion

All the animals of group I, II and III started showing clinical recovery from 2nd day onwards from various symptoms of dullness, depression, dyspnoea, nasal discharge, inappetance, high rise in temperature, lacrimation, abdominal respiration, reduced ruminal motility and scanty faeces. Rapid recovery was noticed in animals of group III with notable changes specially at the time of withdrawal of treatment when only a few symptoms viz. reduced inclination to walk and intake particularly to water were discernible though attempt to take feed started returning towards normalcy along with efficient efforts to accompany other active animals (Table 1). The symptoms such as dullness, depression, inappetance and high rise in temperature may be a reflection of the reaction of the body to its internal changes occurring due to propagation of a variety of micro-organisms, subsequent release of pyrogens and other related intrinsic factors within the system and dyspnoea, nasal discharge, lacrimation may be the outcome of a complex interaction of environmental factors producing stress, a variety of micro organisms working synergistically to damage the cells lining the respiratory tract allowing colonization and invasion of other organisms and a compensated host response. These relate to similar

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observations of Stevenson and Robinson (1970), Lehmkuhl and Cutlip (1984) and Robinson (1983). Out of total fifteen nasal swab samples, fourteen were subjected to bacterial isolation. Based on cultural examination and characterization, a total of 31 pure bacterial isolates (11 Gram positive and 20 Gram negative) were obtained. Out of total 20 Gram negative bacterial isolates, 11 were presumptively identified as *E. coli* and one *Proteus* spp. along with unidentified isolates. Out of total 11 Gram positive isolates, 2 were presumptively identified as *Staphylococcus* spp. Remaining isolates could not be identified. All the pure bacterial isolates were preserved for further characterization by serotyping and PCR. Thirty bacterial isolates were subcultured at desired interval and preserved at 4^0C for further characterization. The therapeutic approach used in G I shown good recovery in less congested cases particularly when diaphragmatic lobe was not or less severely affected as two out of five treated animals continued to show signs of uneasiness even after 5^{th} day of treatment. Amikacin has been a drug of choice in respiratory tract infection (Riviere and Papich, 2009) with certain precautions.

The applied preparation Deriphylline, is a combination of theophylline and etophylline in the ratio of 1:3. Low doses of theophylline have an anti-inflammatory or immunomodulatory effect *in vivo* (Tinkelman *et al*., 1993; Reed *et al.,* 1998*;* Ward *et al*., *1993;* Kidney *et al*., 1995). Though, the molecular mechanism for the anti-inflammatory action of theophylline is currently unknown, but low-dose theophylline is an effective add-on therapy (Kazuhiro *et al*., 2002). More recently it has been shown that low concentrations of theophylline were able to inhibit the activation of NF-êB and reduce the expression of inflammatory genes in a manner similar to corticosteroids (Tomita *et al*., 1999). In addition, eosinophil survival induced by IL-5 and GM-CSF is decreased by low concentrations of theophylline independently from PDE inhibition and changes in cAMP (Ohta *et al*., 1996; Yasui *et al*., 1997)). The effects of theophylline are relatively smaller but it can markedly reduce histone H4 acetylation at the GM-CSF promoter when targeted by dexamethasone (Shute *et al*., *1998*). Waterborg (2000) has shown that even in the resting state histones are acetylated and that small differences in the number of acetylated histones result in biophysical changes. Low-dose theophylline enhances histone deacetylases (HDAC) activity in epithelial cells and macrophages. HDACs are phosphoproteins whose activity is modified according to their phosphorylation status (Pflum *et al*., 2001). This increased HDAC activity is then available for corticosteroid recruitment and predicts a cooperative interaction between corticosteroids and theophylline. This mechanism occurs at therapeutic concentrations of theophylline and is dissociated from phosphodiesterase inhibition (the mechanism of bronchodilation) or the blockade of adenosine receptors, which are partially responsible for its side effects. It inhibits phosphodiesterase, which degrades cyclic nucleotides, hence increased amount of intra cellular CAMP molecules causing smooth muscle relaxation. Overall effect of the drug is to produce bronchodilation by bronichial muscle relaxation and suppression of response of airways to stimuli.

Enrofloxacin is a broad-spectrum bactericidal antibiotic and is effective against a broad spectrum of Gram-positive and gram-negative bacteria (Riviere and Papich, 2009) and accordingly was evaluated in present clinical cases of pneumonia with support of bronchodialators with comparable efficacy. The G III treated group was comparatively

Table 1: Clinical changes in different treated groups

S. No	Symptoms	G I		G II		G III	
		0 day	5^{th} day	0 day	5^{th} day	0 day	5^{th} day
1	Dyspnoea	ˇ	3/5	ˇ	1/5	ˇ	-
2	Nasal discharge	ˇ	-	ˇ	-	ˇ	-
3	Inappetance	ˇ	2/5	ˇ	3/5	ˇ	2/5
4	High rise in temperature	ˇ	-	ˇ	-	ˇ	-
5	Lacrimation	ˇ	-	ˇ	-	ˇ	-
6	Disinclination to walk	ˇ	2/5	ˇ	2/5	ˇ	1/5
7	Abdominal respiration	ˇ	-	ˇ	-	ˇ	-
8	Reduced ruminal motility	ˇ	-	ˇ	-	ˇ	-
9	Scanty faeces	ˇ	-	ˇ	-	ˇ	-

responded well. Ampicillin acts by inhibiting the synthesis of bacterial cell walls. It inhibits cross linkage between the linear peptidoglycan polymer chains that make up a major component of the cell walls of both Gram positive and Gram-negative bacteria. Synergistic antibacterial effects of mixtures of ampicillin and cloxacillin is well known (Bornside, 1968; Sutherland and Batchlor, 1964). To reduce the development of drug-resistant bacteria and maintain the effectiveness of amikacin and other antibacterial drugs, antibiotics should be used only to treat or prevent infections that are proven or strongly suspected to be caused by bacteria and repeated clinical trials are need of the day in view of changing pattern of microbials and antimicrobials and based on present study combination used in G III can be a better choice but after trial on more number of animals.

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