

Original Research Article

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Clinico-Therapeutic Studies in Bovine Respiratory Disease Complex in Buffaloes

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ABSTRACT

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A study was carried out in 24 buffaloes affected with Bovine Respiratory Disease (BRD) Complex, which were diagnosed based on the history and clinical findings of inappetance to anorexia, fever, nasal discharge, coughing, dyspnoea and abnormal lung sounds on auscultation of thoracic area. The affected animals were randomly categorized in three groups for treatment to evaluate the therapeutic efficacy of ceftiofur, levofloxacin and moxifloxacin. Based on remission of clinical signs and symptoms ceftiofur was found to be most effective antibiotic for treatment of BRD complex in buffaloes.

Introduction

Respiratory diseases had notified a major impact on the overall health of bovines and continue to be of great importance even today. Many of the diseases that have been shown to impact the respiratory tract of cattle and buffaloes are grouped into an overall category known as bovine respiratory disease (BRD) complex. This includes shipping fever syndrome, mucosal disease, enzootic calf pneumonia, acute respiratory distress syndrome, haemorrhagic syndrome and atypical interstitial pneumonia (Apley, 2006). Bovine respiratory disease is a result of the complex interaction of bacterial and viral

agents, environmental conditions, management factors and the animal health (Nickell and White, 2010). It is a major health problem of respiratory system occurring worldwide in both dairy and feedlot cattle (Edwards, 2010), responsible for high morbidity and mortality and has been reported to cause heavy economic losses in terms of drug and veterinary costs, extra labour and production losses (Gagea *et al.*, 2006). These agents often produce mild clinical to severe clinical signs and death within 24 to 36 hours or may cause permanent lung damage as fibrosis, adhesions and/or abscesses, in chronic cases, which will impact performance. That is why early recognition and treatment of

BRDC are so important (Kirchhoff *et al.*, 2014). Viral and bacterial agents proliferate, become pathogenic and damage the respiratory tract during the progression of subsequent respiratory disease (Panciera, 2010). The clinical signs of BRD complex vary according to the animal status, the level of stress that animal experiences, management practices and quantum of pathogen challenge (Smith, 2009; Snowden, 2009). The present study was undertaken to investigate the various clinical findings observed in buffaloes affected with BRD complex and to evaluate the therapeutic efficacy of ceftiofur, levofloxacin and moxifloxacin.

Materials and Methods

The study was conducted on 24 clinical cases of BRD complex in buffaloes which were reported at Teaching Veterinary Clinical Complex (TVCC), LalaLajpatRai University of Veterinary and Animal Sciences, Hisar (Haryana). A complete case history of affected animals was obtained from the animal's owners and handlers. Eight apparently healthy buffaloes were also included in this study as control group. Thorough clinical examination of the suspected animals was made which included auscultation of thoracic area, recording of rectal body temperature, status of nasal discharge and coughing, respiratory rate and pattern, and mucus membranes. Gender wise all the affected animals were female belongs to different parities (1st to 6th parity) and aged ranging from 4 – 10 years. Animals having history and clinical symptoms of inappetance to anorexia, fever, nasal discharge, coughing, dyspnoea and abnormal lung sounds on auscultation were diagnosed to be suffered from BRD complex and considered for this study. To compare the therapeutic efficacy of ceftiofur, levofloxacin and moxifloxacin these 24 buffaloes affected with BRD complex were randomly categorized into three groups (group – I, II and

III) with eight animals in each group. Ceftiofur @ 2.2 mg/kg body weight (group – I), levofloxacin @ 4 mg/kg body weight (group – II) and moxifloxacin @ 5 mg/kg body weight (group – III) was administered by intramuscular route once daily for 3 – 7 days depending on remission of clinical signs and symptoms. In addition to this, supportive therapy in the form of antihistaminics, non-steroidal anti-inflammatory drugs (NSAID), respiratory stimulants, liver extract, multivitamins and corticosteroids was given in recommended doses where warranted. Therapeutic efficacy of these three antibiotics was evaluated based on the remission of clinical signs and symptoms of BRD complex in affected animals and regaining of normal appetite during the course of treatment of 3 – 7 days.

Results and Discussion

Typically, diagnosis of BRD complex is based on a combination of objective (rectal body temperature, body weight) and subjective (depression, abnormal appetite and respiratory signs) assessments of affected animals, which is also concluded by many other researchers (Apley, 2006; Step *et al.*, 2008; Patel *et al.*, 2017; Arslan and Ozcan, 2018). Severity of clinical signs of BRD complex varies from unapparent to per-acute death as reported by Confer (2009) and Griffin *et al.*, (2010). When clinical signs are observed, they are usually evident between 7 to 10 days after the stressful situation; however, in newly acquired buffalo, clinical signs can be present as late as 27 days after acquirement. This kind of findings was also observed in cattle by Zecchinon *et al.*, (2005) and Griffin *et al.*, (2010). During the course of this study the following clinical observations were made i.e. rectal body temperature, status of appetite (inappetence/anorexia), coughing, nasal discharge, dyspnoea and auscultation of thoracic area for abnormal lung sounds in all

animals included in this regime. Healthy control group animals were without any clinical signs. The mean±SE values of rectal body temperature of all the animals have been presented in table 1. Average body temperature of eight healthy animals kept in control group was 101.33±0.38 °F. Animals of group I which were treated with ceftiofur had an average body temperature of 102.8±1.41 °F on day 0 which after 3 days of treatment returned to near normal to 101.76±0.99 °F followed by 101.76±0.99 °F and 100.52±0.95 °F on 5 and 7 days post treatment, respectively. The average temperature of the animals treated with levofloxacin (Group – II) was 102.47±1.56 °F on day 0, which returned to 101.91±1.01 °F, 100.95±0.9 °F and 100.48±0.57°F on day 3, 5 and 7 post treatment, respectively. Moxifloxacin treated group animals (Group – III) showed the average body temperature as 103.08±0.88 °F on day 0 which was later recorded as 102.43±0.6 °F, 101.62±0.67 °F and 100.82±0.46 °F on 3, 5 and 7 days of post treatment, respectively.

The status of anorexia/inappetence was recorded on day 0 and post treatment days and has been presented in table 1. Control group animals were of normal appetite on day 0 while the animals of all the three groups affected with BRD complex were anorectic on the day of observation. In the ceftiofur treated animals, on day 3, three out of eight animals were anorectic and no animal was anorectic on day 5 of treatment. In levofloxacin treated group, all the animals were anorectic on day 3 while three out of eight animals were anorectic on day 5 and no animal was anorectic on day 7 of treatment. All the eight animals were anorectic in moxifloxacin treated group on day 3 and six out of eight were anorectic on day 5 of treatment respectively. On day 7 of treatment two animals were still showing the signs of inappetence to anorexia in moxifloxacin

treated group. On the day of observation (day 0) all the 24 affected buffaloes showing the clinical abnormalities in the form of coughing, nasal discharge, dyspnoea or abnormal auscultation findings in the thoracic area (Table 1). In the animals of groups treated with ceftiofur and levofloxacin it takes 5 and 7 days to get rid of these abnormal clinical findings, respectively. In the moxifloxacin treated group two out of eight animals were still showing the signs of coughing, nasal discharge, dyspnoea and abnormal auscultation findings even on day 7 of the treatment. In the present study, affected animals were showing high rectal temperature, anorexia/inappetence, coughing which varied in its duration, watery to serous type of nasal discharge and abnormal lung sounds such as crackles, wheezes, plueritic frictional rubs etc. during the course of investigation. Similar types of findings were consistently observed by various other researchers (Zecchinon *et al.*, 2005; Confer, 2009; Griffin *et al.*, 2010; Ozkanlar *et al.*, 2012; Urban – Chmiel and Grooms, 2012; Scott, 2013; Love *et al.*, 2014) during their studies on respiratory tract diseases in animals. Depending on the severity of anorexia, animals can experience slight to severe weight loss. Similar findings were also observed by Zecchinon *et al.*, (2005). The clinical expression of BRD complex varies according to the animal, the level of stress that animal experiences, management practices prior to and after the marketing process and level of pathogen challenge as also observed similarly by Snowden *et al.*, 2006; Sanderson, 2008; Smith, 2009 and Snowden, 2009. Some scientists developed scoring systems based on the severity and duration of clinical signs and symptoms of BRD Complex (Perino and Apley, 1998 and Love *et al.*, 2016) but these scoring systems had not found much importance in Indian scenario due to lack of well-organized farming practices as well as variable environmental and stress causing conditions.

Table.1 Clinical status of control and BRD complex affected buffaloes before and after treatment (n = 8 in each group)

Group	Clinical Signs and Symptoms					
	Inappetence / Anorexia	Coughing	Nasal Discharge	Dyspnoea	Abnormal Auscultation Findings	Rectal Body Temperature (°F) (Mean±SE)
Control Group	No	No	No	No	No	101.33±0.38
Ceftiofur Treated Group (Group – I)						
Day 0	8(+++)	8(+++)	7(+++)	6(+++)	7	102.8±1.41
Day 3	3(+)	3(+)	3(++)	2(+)	2	101.76±0.99
Day 5	0(-)	0(-)	0(-)	0(-)	0	101.76±0.99
Day 7	0(-)	0(-)	0(-)	0(-)	0	100.52±0.95
Levofloxacin Treated Group (Group – II)						
Day 0	8(+++)	8(+++)	8(+++)	7(+++)	8	102.47±1.56
Day 3	8(+++)	6(++)	7(+++)	6(++)	3	101.91±1.01
Day 5	3(++)	1(+)	3(+)	2(+)	1	100.95±0.9
Day 7	0(-)	0(-)	0(-)	0(-)	0	100.48±0.57
Moxifloxacin Treated Group (Group – III)						
Day 0	8(+++)	8(+++)	8(+++)	6(+++)	8	103.08±0.88
Day 3	8(+++)	8(+++)	8(+++)	6(++)	5	102.43±0.6
Day 5	6(++)	4(++)	6(++)	3(++)	3	101.62±0.67
Day 7	2(+)	1(+)	1(+)	1(+)	2	100.82±0.46

+ Mild, ++ Moderate, +++ Severe, - Absent

The therapeutic regimen used in the present study comprised of three different antibiotics along with supportive measures, at times determined by clinical observations. Ceftiofur is a broad spectrum third-generation cephalosporin developed for the treatment of bovine respiratory disease (BRD) (Yancey *et al.*, 1987) has demonstrated high *in vitro* activity against both Gram-positive and Gram-negative bacteria including bacterial pathogens associated with respiratory diseases (Hornish and Katariski, 2002). Levofloxacin is a second generation fluoroquinolone possesses excellent activity against Gram-positive, Gram negative and anaerobic bacteria (North *et al.*, 1998). Moxifloxacin is a novel fourth generation fluoroquinolone with a broad spectrum antibacterial activity against Gram-positive, Gram-negative bacteria and anaerobes (Kowalski *et al.*, 2003), and its lower MIC

values and high serum and tissue concentration makes it a suitable antimicrobial for treating various infectious diseases including those of upper and lower respiratory tract (Blondeau and Hansen, 2001). In the present study, ceftiofur showed recovery in affected buffaloes in 3 days as evidenced by remission of clinical signs and symptoms while it was recorded in 5 days and 7 days after treatment with levofloxacin and moxifloxacin, respectively. Ceftiofur has also been previously used with good efficacy for the treatment of BRD complex by many researchers (Jim *et al.*, 1992; Lockwood *et al.*, 2003; Abutarbush *et al.*, 2012 and Stegner *et al.*, 2013). On the basis of remission clinical signs and symptoms (Inappetence/anorexia, coughing, nasal discharge, dyspnoea, abnormal auscultation findings and rectal body temperature), ceftiofur was found to be most effective antimicrobial for the treatment of BRD

complex in buffaloes followed by levofloxacin and moxifloxacin.

In conclusion, BRD complex in buffaloes is still an important disease and will be serious problem for dairy industry in India for some more time because of its complex etiological structure and variability in therapeutic efficacy of various treatment regimens. Increasing antibiotic resistance to the pathogens is one of the negative parts of the situation; therefore treatment alternatives are getting decrease while treatment cost is increasing. In this frame, prevention and early diagnose of BRD based on clinical signs and symptoms have more importance for future of the dairy industry worldwide.

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