

## Effectiveness of conventional and alternative therapy in treatment of respiratory infections in poultry

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### Abstract

A flock of 12000 commercial broilers of 3 weeks age were observed to exhibit the clinical signs like, dullness, anorexia, sneezing, coughing with facial edema, which was tentatively diagnosed for respiratory disease (RD). For treatment these birds were divided into two groups A and B each comprised of 6000 birds. Group A birds were treated with enrofloxacin (10%) liquid @ 10 mg/kg body weight for 5 days and group B received polyherbal formulation AV/CRP/11 (new coded formulation supplied by Ayurved Limited, Baddi India) @ 20 ml/100 birds for 5 days. The parameters studied were clinical signs, growth, performance, morbidity, livability, mortality, post mortem findings (gross lesions), air sac and intestinal lesion scores and histopathological changes. Both treatments showed improvement in average growth and performance parameters with recovery in clinical signs, histopathological alterations, morbidity and mortality percentage and enhanced livability. The polyherbal formulation was found to be equally efficacious like Enrofloxacin in treating respiratory disease.

**Key words:** Broilers, Histo-pathology, Enrofloxacin, Respiratory infection, Alternative Therapy.

### Introduction

Small poultry flocks are susceptible to a number of respiratory infections. Some of these produce extremely mild illness while others may result in a high number of deaths mostly due to *Mycoplasma gallisepticum* infection (Stipkovits et al.1996). Respiratory infection is the most serious disease affecting poultry and causes heavy economic losses in the poultry industry worldwide (Murthy et al. 2008). In avian host, several microorganisms of the genus *Pasteurella* (*P. multocida*, *P. gallinarum*, *P. haemolytica* and *P. anatipestifer*), *Bordetella* (*B. avium*) and *Haemophilus* (*H. paragallinarum*) were involved in respiratory diseases complex (Hafez et al. 2002). *Escherichia coli* associated with respiratory infection in chickens has also been reported (El-Sukhon et al.2002). *Ornithobacterium rhinotracheale* has recently been identified as a pathogen causing respiratory tract infection in poultry and other birds (Chin et al.2003). Tracheitis, exudative pneumonia, pleuritis, air sacculitis, pericarditis, sinusitis, characterize the infection (Zorman-Rojs et al. 2000; Canal et al. 2005). *Ornithobacterium rhinotracheale* has been isolated from chicken, turkeys, quails, ducks, geese, ostriches,

guinea fowl, pheasants, rooks and pigeons. Bacterial pathogens play an important role in causing respiratory disease in domestic poultry species. Respiratory infection or infectious coryza or infectious laryngotracheitis, bronchitis caused by *Escherichia coli* (Murthy et al. 2005) environmental factors may increase the clinical symptoms where predominant organ system affected is the respiratory tract (Nunoya et al.1987). Regardless of whether birds are raised for meat, eggs, breeding or show purposes, respiratory infections result in decreased performance and ultimately lead to economic loss. The main causative agent of the *Mycoplasma gallisepticum*, which causes a debilitating respiratory disease (RD) in poultry (Levisohn et al. 2000), which was difficult to detect and control with currently available technology (Rao et al.1966). All of the pathogenic mycoplasmas are egg-transmitted. *M. gallinarum* was shown to be involved in an outbreak of respiratory disease in commercial broilers (Kleven et al.1978; Levisohn et al. 2000), and *M. pullorum* has been associated with turkey embryo mortality in France (Moalic et al.1997). The route of infection in poultry is via the conjunctiva or upper respiratory tract with an incubation period of 6-10 days. Enrofloxacin and

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Norfloxacin-nicotinate are the drugs used now a day to treat the RD, which may produces the bacterial resistance though they are effective in treating the RD (Sumano et al. 1998). Antibiotics are used to control the respiratory infections in poultry but the main problem which tends to decline their use is bacterial resistance (Hayes et al. 1999). With worldwide concern over the use of prophylactic antibiotics in animals, birds and its contribution to the spread of antibiotic resistance, the development of alternatives is urgently needed to protect animals from bacterial infections. (FDA 2003). Enrofloxacin was banned for poultry use in India due to its side effects like permanent blindness, anorexia etc (Morgan et al. 2005). There is a great need to search for suitable alternatives to antibiotics. With this aim, in the present study polyherbal formulation was used & evaluate its efficacy in treating respiratory infection in broilers.

#### Materials and Methods

The current study was conducted at Veterinary Biological Research Institute, Hyderabad, India. The commercial broilers farm located at Nalgonda, Andhra Pradesh under standard management conditions. The flock of about 3 weeks age was found to be affected with respiratory disease & showed symptoms of dullness, anorexia, respiratory rales, sneezing, coughing with facial edema. All the birds were divided into two groups A & B consisting 6000 birds each. It was decided to treat birds with standard antibiotics and alternative therapy. Group A was treated with conventional therapy Enrofloxacin (10%) liquid @ 10g/kg body weight for 5 days and group B administered with AV/CRP/11 (new coded formulation supplied by Ayurvet Limited Baddi India) @ 20 ml/100 birds for 5 days. Constituent herbs of polyherbal formulation AV/CRP/11 were Glycyrrhiza glabra, Curcuma longa, Alpinia galanga, Ocimum sanctum, Allium sativum and many more. The parameters studied were Clinical signs, growth related like body weight gain, feed conversion ratio, livability, morbidity, mortality, post mortem lesions and histopathology.

In post mortem air-sac and intestinal lesions scores were recorded by the method given by Nascimento et al. (2005). The score of '0' indicates no lesions, '1' imild to moderate air-sacculitis, '2' if moderate air-sacculitis and mild to moderate pericarditis and or per-hepatitis and '3' if sever air-sacculitis and moderate to severe pericarditis and/or perihepatitis.

#### Results and Discussion

**Clinical Signs:** Pretreated birds exhibited the clinical symptoms of dullness, anorexia, sneezing, coughing with facial edema. Significant recovery was

reported in both the groups from day 7th to 12th after treatment (Table 1). Similar results were also reported by Nunoya et al. (1987), according to which antibiotic therapy was found to be efficacious in control respiratory infection in broilers.

**Growth and Performance Parameters:** The average body weight gain in group B treated with polyherbal formulation is 1890 gms/bird in comparison with 1845 gms/bird in Group A treated with the Enrofloxacin. The additional weight gain is  $45 \pm 0.08$  gms/bird in group B administered with polyherbal formulation and feed consumption is  $25 \pm 0.06$  gms lower than group A birds. There is significant improvement in the feed conversion efficiency (FCR) after treatment in both groups A & B. Improvement in the growth and general body condition of the birds was also reported by Sumano et al. (1998) when given antibiotic therapy in respiratory disease.

**Mortality & Livability:** The results revealed that before treatment mortality in both groups was higher (80-90%) which was declined after treatment. Group B administered with polyherbal formulation had much lower mortality (1.88%) as compared to Group A (3.06%); thus the livability in the administered group has improved by 1.18% (Table.3, 4 & 5). Though the mortality percentage in both was reduced but re-occurrence in group A after 5 days with a daily mortality of again 16-17 birds/day was evident. In contrast, no such re-occurrence was observed in birds of Group B administered with polyherbal formulation.

**Post-mortem Findings:** The post mortem findings before treatment in both the groups were found to be more severe as compared to after treatment. The post mortem findings were perihepatitis, pericarditis, air sacculitis, trachetitis and pneumonic lungs. The results were concomitant with the findings of (Georgopoulou, et al. 2005 & Macowan et al. 1982). Post mortem of treated birds revealed milder leisions on liver, heart, kidney & lung. However, no significant difference was reported among the treated group. Milder lesions still persisted in group A even on day 7th-10th post treatment. However, such types of lesions were not recorded in group B treated with polyherbal formulation (Table 3). Both the lesions were significantly lower in group B as compared to group A (Table.1, 2 & Table 4).

**Histopathological Findings:** Histopathological finding before the treatment in both groups was found to be more severe as compared to after treatment. In pre-treated birds, air sacs were thickened with infiltration of heterophils and mononuclear cell with areas of degeneration and necrosis. After treatment these signs were recovered as indicated by invasion of goblet cells. Trachea showing congestion of blood vessels in the lamina propria with hypertrophy of mucous glands, oedema and mono nuclear cell infiltration were brought

Table-1. Scoring of clinical symptoms of the birds in group A and B

Sr.No.	Symptoms	3rd Day		7th Day		10th Day	
		A	B	A	B	A	B
1.	Dullness	+	+	+	0	+	0
2.	Reduced feed consumption	+	+	+	0	+	0
3.	Facial Oedema	0	0	0	0	+	0
4.	Sneezing, coughing etc.	+	0	0	0	+	0

to normal after treatment with polyherbal formulation. Congestion of blood vessels in the lamina propria with hypertrophy of mucous glands and there was thickening of the mucosa with mono nuclear cell infiltration and oedema. Parenchyma was filled with exudates consisting mainly of heterophils with mono nuclear cell infiltration, presence of fibrin material hyperemia and oedema. Lung parenchyma was filled with exudates consisting mainly of heterophils with mono nuclear cell infiltration which was normalized after polyherbal formulation treatment. Degenerative changes in the liver and heart were ameliorated in group B birds as compared to the treatment group A receiving conventional treatment. These findings are in congruence with those reported by Nascimento et al. (2005). Both the treatments were found to be equally efficacious in treating respiratory infection. Polyherbal formulation (AV/CRP/11) might be efficacious owing to the pharmacological properties of individual herbal constituents viz, *Glycyrrhiza glabra*, *Curcuma longa*, *Alpinia galanga*, *Ocimum sanctum*, *Allium sativum* and many more which are scientifically well proven to have curative role in respiratory infections. *Glycyrrhiza glabra* has expectorant and bronchiodilator activity (Loosen et al. 1955). *Alpinia galanga* is well known for its expectorant property (Inamdar et al.1962). *Curcuma longa* helps in treating respiratory infection & bronchial asthma (J.P Jain et al. 1989 and Singh et al. 2005). *Ocimum sanctum* has antiasthmatic and anti-inflammatory activity property (Singh et al. 1991).

#### Conclusion:

The present study indicates that both Enrofloxacin and polyherbal formulation (AV/CRP/11) were equally effective in the treatment of RD. This is manifested by reduced clinical signs, improvement in growth related parameters, livability, reduced morbidity & mortality etc. Air-sac and intestinal lesion scores together with histopathological changes were also normalized. It is note worthy that in (AV/CRP/11) being a polyherbal formulation does not have any adverse effect and no recurrence of disease occurred in treated birds or any emergence of bacterial resistance against Enrofloxacin treatment. Thus, AV/CRP/11 can be an alternative to conventional antibiotic therapy.

Table-2. Mortality (%) in different groups at day intervals in group A &amp; B

Days of Treatment	Group A	Group B
1	12	9
2	9	7
3	6	4
4	4	3
5	3	2
6	2	0
7	2	0
8	1	0
9	2	0
10	1	0
11	16	0
12	17	0

Table-3. Post Mortem Findings of group A &amp; B birds at different intervals

Sr. No.	Type of Lesion	3rd Day		10th Day	
		A	B	A	B
1.	Air sacculitis	+	+	+	0
2.	Peri-hepatitis	+	+	+	0
3.	Peri- cariditis	+	+	+	0
4.	Tracheitis	+	0	+	0
5.	Lungs	+	0	+	0

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Table-4. Air-Sac and Intestinal Lesion Scores of group A and B birds

Sr.No.	Age(Weeks)	Air-Sac Lesion Scores		Intestinal lesion Scores	
		Group A	Group B	Group A	Group B
1.	1	0	0	0	0
2.	2	0	0	0	0
3.	3	0	0	0	0
4.	4	2	2	2	2
5.	5	1	1	2	1
6.	6	2	0	1	0

Table-5. Mean growth and performance parameter of group A and B birds (n= 3000)

Sr.No.	Parameters	Group - A	Group - B
		(Conventional Therapy)	(AV/CRP/11)
1.	Initial body weight (Gin)	40±0.05	40±0.07
2.	Average body weight at 42nd day (Gm)	1845±1.80	1890 ± 1.87
3.	Average feed consumption (Gm)"	3760±2.06	3735± 2.03
4.	Feed conversion ratio	2.03±0.04	1.97 ± 0.07
5.	Mortality (%)	3.06±0.05	1.88 ±0.06
6.	Due to CRD (prior to treatment)	1.2±0.06	1.2 ± 0.09
7.	During treatment	0.56±0.03	0.41 ± 0.8
8.	After treatment	0.73±0.02	0.91±0.06
9.	(general mortality	0.57±0.04	0.27± 0.08
10.	Livability (%)	96.94±0.09	98.12±0.5