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EFFICACY OF TYLOSIN AND TIAMULIN AGAINST MYCOPLASMOSIS IN POULTRY

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ABSTRACT

Chronic respiratory disease (CRD) is one of the most important veterinary diseases in Bangladesh and all over the world. Mortality, reducing of weight gain and increasing of feed conversion ratio (FCR) are caused by CRD. Several drugs are used for prevention and control of Mycoplasmosis. It is caused by *Mycoplasma gallisepticum* (MG). Tylosin and Tiamulin are effective on *M. gallisepticum*. By considering generating resistance against antibiotics that is effective on MG, studying the effect of these drugs in the treatment and prevention of Mycoplasmosis in birds were the purpose of this research. In this study, 36 layer birds (MG positive) of 25 weeks aged divided in three similar groups (A, B and C) contain 12 birds in each group. In group A; Tylosin was administered after mixing with 2.5 gm in 1 L drinking water, for Group B; Tiamulin was administered after mixing with feed @ 0.45gm/kg feed and Group C; Control (No antibiotic was given, only common feeding). The Serum Plate Agglutination (SPA) test was conducted; in positive cases granules were formed slowly which could be seen during rocking. In the negative case, no such granules were formed. Overall 6 and 9 serums shown negative SPA test in Group A and Group B, respectively. Therefore, the efficacy of Tylosin was 50.00% and the Tiamulin was 75.00% which resemble statistically significant ($P<0.05$). In control group, 5 birds were died during experiment. It can be concluded that usage of these antibiotics especially Tiamulin can be essential in the treatment and prevention of Mycoplasmosis in birds.

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INTRODUCTION

In Bangladesh poultry farms are growing fast for the last two decades. About 89% of the rural households rear poultry at either subsistence or commercial level (Anonymous, 1998). Poultry industry in Bangladesh is facing a number of constraints. One of the major constraints is the outbreak of diseases that causes about 30% mortality of chickens in every year (Ali, 1994). Prevalence of bacterial, viral, mycoplasmal, protozoal, parasitic, fungal and non-infectious diseases were 45%, 17%, 12.4%, 6.6%, 4.5%, 1.5% and 12.4% respectively were observed in the birds examined (Sarker et al., 2015, Saleque et al., 2003). Infectious bursal disease accounted for 33% of total deaths in the commercial broiler industry, while salmonellosis, mycoplasmosis and Newcastle disease caused 16.9%, 26.2% and 9.8% loss, respectively, in breeding flocks.

Mycoplasmas are of considerable veterinary importance in birds. For poultry, the predominant mycoplasmal pathogens are *Mycoplasma gallisepticum*, *Mycoplasma synoviae*, and *Mycoplasma iowae*. *M. gallisepticum* infection commonly induces chronic respiratory disease in chickens (Ley and Yoder, 1997). The clinical signs include nasal discharge, coughing, sneezing, tracheal rales and mild conjunctivitis. MG infection causes significant economic losses to the poultry industry throughout the world. It causes a reduction in egg production of 10 to 20%, an increase in embryo mortality and chick mortality of 5 to 10% and a reduction in weight gain and feed conversion ratio (FCR) by 10 to 20% (Wary and Davies, 2002). MG predisposes birds to other infectious agents, such as *Escherichia coli* and *Haemophilus paragallinarum* through the inhibition of immune functions (Ley, 2008). In the complicated infections, the severity of the disease is greatly affected by the degree of secondary infection with viruses, such as Newcastle disease and infectious bronchitis, and/or bacteria, such as E. coli (Fritz, 1992). Diagnosis of the disease is based on epidemiological data, clinical signs of the disease, analysis of macro-and microscopic lesions, culture isolation and mycoplasma serology and/or isolation and identification. The most used serological tests are serum plate agglutination (SPA), hemagglutination inhibition (HI), and enzyme-linked immunosorbent assay (ELISA).

Different antimicrobials, especially antibiotics have been used to treat flocks infected with MG and MS in order to reduce severity of clinical signs, lesions and production losses (Bencina and Bradbury, 1992). Such treatment can reduce severity of disease, economic losses, populations of Mycoplasmas, but does not eliminate MG and MS from the infected poultry flock. Tylosin and Tiamulin are the most widely used molecules in medication programs in mycoplasmosis in layer birds (Carpenter et al., 2009). In Bangladesh both Tylosin and Tiamulin are used to treat mycoplasmosis, but the purpose of this research project is to screen out which one is more effective against mycoplasmosis. Therefore, the present study was conducted to know the efficacy of tylosin and tiamulin against mycoplasmosis in layer birds.

MATERIALS AND METHODS

Birds' management

A total of 36 infected layer birds of 25 weeks aged were selected. The collected birds were furthermore divided into two groups. Group A contained 12 birds were treated with Tylosin, Group B contained 12 which were treated by Tiamulin and Group C contained rest of 12 birds considered for control (No treatment was given). All birds were kept in cage, commercial poultry feed (Naurish feed Ltd.) were fed and recommended drugs were administered via drinking water. For Tylosin; Tylovet (ACME Pharmaceuticals Ltd.) was administered after mixing with 2.5 gm in 1 L drinking water and for Tiamulin; Denagard (Elanco Ltd.) was administered after mixing with feed @ 0.45gm/kg feed.

Blood collection and serum preparation

In live birds, 1-1.5 ml blood were collected from wing vein by using fresh disposable plastic syringe (3 ml) and collected blood was kept in room temperature for about 1-2 hours. A clean straw colour serum was seen around the clotted clump and the serum was poured into a labeled and stored at 4ºC until used.

Serum plate agglutination (SPA) test

Serum plate agglutination (SPA) test was performed according to Amer et al., 2009. Briefly, 0.03 ml antigen and 0.03 ml fresh serum was placed side by side with pipette in a glass plate and mixed well by stirring with glass rod, followed by rocking. Results were read within 2 minutes. In positive cases granules were formed slowly which could be seen during rocking. In the negative case, no such granules were formed. All SPA results were recorded. However, in our study the SPA test was conducted with crystal violet stained *M. gallisepticum* commercial antigen obtained from Intervet Company Ltd. (The Netherlands).

Statistical analysis

Analysis was done by SPSS IBM 20 for descriptive statistics (IBM Corp. Released 2011, IBM SPSS Statistics for Windows, Version 20, Armonk, New York USA: IBM Corp).

RESULTS AND DISCUSSIONS

In group A (for Tylosin) 6 birds blood shown negative results in SPA test and rest of 6 shown positive test result. In group B, (for Tiamulin) 9 birds blood shown negative results in SPA test and rest of 3 shown positive test result. In group C, five birds were died during experiment and rest of 7 birds shown positive SPA test. The details result of Tylosin and Tiamulin was shown in Table 1.

Table 1. Overall efficacy of Tylosin and Tiamulin

Antibiotic	Total No. of Sample	SPA test		Efficacy (%)	P Value
		Negative	Positive		
Tylosin	12	6	6	50	<0.05*
Tiamulin	12	9	3	75	
Control	12[a]	0	7	-	
Total	12	15	16		

[a]Five birds were died during experiments

* Statistical significant variation between the efficacy of Tylosin and Tiamulin was present (P value <0.05)

The study is in agreement with Arzey and Arzey, (1992), who evaluated efficacy of Tiamulin, Tylosin, Spiramycin oxytetracyline and dihydrostreptomycin at different dosages to layer hens naturally infected with *Mycoplasma gallisepticum*. The cure rate was significantly higher (P less than 0.05) in treated hens than in un-treated hens, as early as 1 day after treatment. The findings also agree with Baughn et al. (1978). He studied effect of tiamulin in chickens and turkeys infected experimentally with avian Mycoplasma. Tiamulin was more effective than the reference antibiotics in preventing and eradicating airsacculitis caused by *Mycoplasma gallisepticum*. Glisson et al. (1989) investigated the effect of oxytetracyline (OTC) on the severity of airsacculitis in chickens infected with *Mycoplasma gallisepticum*. There was a similarity in the efficacy of tiamulin studied by Youxiang et al. (2003), who worked out the efficacy of tiamulin and chlortetracycline in feed in the control of CRD in broilers.

One of the important factors in successful control of Mycoplasma infections by these antibiotics is selection and proper use of them in order to get effective level of drug in blood. Variables like birds' age, environment temperature, drug levels and drug-water palatability are able to influence the water consumption and drug intake level. Otherwise, pharmacologic properties of drug products like as absorption, diffusion, metabolism and excretion, are effective on drug level in blood (Wary and Davies, 2002).

Considering these results, it is obvious that the preventive and treatment levels of Tylosin and tiamulin for MG infection in layers, influences the productive parameters like body weight gain, FCR, egg production and mortality. These results are fairly like that the results in Britain studies (Youxiang et al., 2008). The findings of our study is consisted with Han et al. (2006), Koutoulis et al. (2013), Zakeri (2011), and Islam et al. (2009). However, it is well known that the effects of Mycoplasma in uncomplicated infection may be minimal but are often enhanced in the presence of other respiratory pathogens such as pathogenic serotypes of E. coli and the viruses of ND and IBV, even vaccine strains (Ley, 2008). The role of MS infection in the layer chicken industry is still unclear and under debate, but it is also well known that the effects of MS in uncomplicated infection may be minimal (Ley, 2008). MG titers at 25 weeks of age indicated that the flock was infected with MG a few weeks later than MS. Unfortunately, due to NDV biosecurity measures was not able to identify the exact time of infection. In all such mixed infections the timing of the infections with respect to each other and to the age of the bird may well influence the outcome and the disease severity.

Furthermore it is apparent that there are more complex interactions between some pathogens whereby a mixture of three agents could cause more severe respiratory disease than any two of them combined. MG infection in chickens with E. coli and respiratory vaccine viruses is one such example (Nakamura et al., 1994).

CONCLUSION

Mycoplasma spp. causes severe health and production problems in layers. Tiamulin treatment in right time and dosage under field conditions can be used to treat the disease, comparatively Tylosin administration. However, it may be concluded that the tiamulin, as an antibiotic, can be useful in poultry production for the treatment of Mycoplasma infections.

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