

Efficacy of a herbal complex against caecal coccidiosis in broiler chickens

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ABSTRACT

The anticoccidial efficacy of a herbal complex consisting of *Solanum nigrum* (35%), *Aloe vera* (15%), *Moringa indica* (35%) and *Mentha arvensis* (15%) was tested against *Eimeria tenella* infection in broilers. Thirty day old broiler chicks were divided into 5 experimental groups, each group having 6 chicks, and were maintained on an anticoccidial free diet. Groups A, B, C and D were challenged with 30,000 sporulated oocysts of *E. tenella* at day 28 of age, while group E served as the uninfected unmedicated control. After 3 days of challenge infection, the birds belonging to groups A and B were treated with herbal complex at the dose rate of 5 and 10% for 7 days continuously. Group C was fed with Salinomycin mixed feed for the same period. In the treatment groups, the birds that received 10% (group B) herbal complex showed better body mass gain between the 4th and 5th weeks (344.34 ± 59.81 gm), superior feed conversion ratio (1.77 ± 0.43) and moderate caecal length (11.5 ± 1.19 cm). However, there was no significant difference in the oocyst output between all the treated and control groups. The body mass gain, FCR and caecal length of the uninfected unmedicated group were 461.86 ± 87.03 , 1.70 ± 0.46 and 16.9 ± 1.2 cm respectively. Mortality of birds was recorded in groups A and D only.

Key words: anticoccidial efficacy, herbal, *Eimeria tenella*, broiler

Introduction

Coccidiosis causes considerable economic loss in the poultry industry, especially in broiler chickens. Chickens are susceptible to at least 9 species of coccidia. The most common species are *Eimeria tenella*, which causes the caecal coccidiosis, while *E. acervulina* and

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E. maxima, causing chronic intestinal coccidiosis. Coccidiosis is associated with reduced growth rate, impaired feed conversion leading to poor performance of broiler chickens and mortality. Currently, coccidiosis control programmes largely rely on chemotherapy and immunoprophylaxis. But development of drug resistance in strains in the field and the withdrawal period for these drugs prior to slaughter necessitate the exploration of alternative methods for controlling coccidiosis. YOUN and NOH (2001) tested 15 herbal extracts for anticoccidial activity in chicks with varying degrees of results. Herbs like *Solanum nigrum*, *Aloe vera*, *Moringa indica* and *Mentha arvensis*, are used traditionally to treat ulcers and various ailments in human beings in India. Hence, a study was undertaken to find out the anticoccidial efficacy of a herbal complex in broilers.

Materials and methods

A total of 30 day - old broiler chicks, procured from a hatchery, were divided into 5 groups (A, B, C, D and E) of 6 chicks each and maintained in a cage system for 39 days. During this period, the birds were fed with anticoccidial free feed, except group C, which received Salinomycin mixed feed for a week. Chicks in groups A, B, C and D were challenged with 30,000 sporulated oocysts of *E. tenella* on 28th day of age (KURKURE et al., 2006), while chicks in groups D and E served as positive and negative controls respectively. After 3 days of challenge infection, the chicks in groups A and B were treated with 5% and 10% herbal complex in water respectively, while group C was treated with standard anticoccidial drug salinomycin in the feed.

Composition of herbal formulation. The herbal complex was prepared by mixing extracts obtained from fresh leaves of four plants, viz., *Solanum nigrum* (35%), *Moringa indica* (35%), *Aloe vera* (15%), and *Mentha arvensis* (15%). This herbal complex was mixed with water at 5% and 10% level, provided to the birds in the morning for 7 days continuously.

Growth performance. Body mass gain and feed intake of birds from all groups were recorded at weekly intervals for up to 5th weeks of age. The general health of the birds and mortality, if any, were also monitored regularly.

Estimation of oocyst. Droppings were collected from all groups on days 6, 7, 8, 9 and 10 of post challenge for estimation of oocyst per gram of faeces (OPG) by Mc Master egg counting technique (SOULSBY, 1982).

Pathological study. All the birds were sacrificed on day 11-post challenge to determine the lesions score and caecal length (JOHNSON and REID, 1970). For histopathological observations representative tissues of caeca were collected in 10% formalin. Tissues were processed by standard methods and stained by haematoxylin and eosin (LUNA, 1968).

Results

Clinical observation. Although all the birds that were challenged with *E. tenella* had severe blood tinged diarrhoea, mortality was only recorded in groups A and D. It was observed that the birds did not show any difference in taking herbal mixed water.

Growth performance. The mean body mass gain (between 4th and 5th weeks) of chicks from groups A, B, C, D and E was 268.92 ± 87.03 , 344.34 ± 59.81 , 301.3 ± 88.62 , 295.9 ± 39.65 , and 461.86 ± 87.03 g respectively. The body mass gain of birds that received 10% herbal complex (B) was higher than those of birds treated with 5% herbal formulation (A), the standard drug Salinomycin (C) and the control group. However, the birds belonging to the uninfected unmedicated group had better body mass gain (461.86 ± 87.03 g) compared to all other groups.

The cumulative feed conversion ratio of chicks of the different groups, viz., A, B, C, D and E was 1.84 ± 0.57 , 1.77 ± 0.43 , 1.75 ± 0.30 , 1.95 ± 0.53 and 1.70 ± 0.46 respectively. The cumulative feed conversion ratio was superior (1.70 ± 0.46) in the uninfected unmedicated group, followed by birds treated with Salinomycin and 10% herbal complex.

Estimation of oocyst. The oocysts per gram (OPG) of faeces of birds from the different groups were observed from day 6-post challenge. The shedding of oocysts was recorded as early as on the 7th day post challenge, in birds in groups A and D. There was no significant difference in the OPG between the herbal treated group and the control. However, low OPG was observed in group C (Salinomycin) as compared to other groups. The OPG started to decline from day 10 post challenge in all the groups.

Caecal length and lesion scores. Average caecal length in birds belonging to groups A, B, C and D was 9.6 ± 1.19 cm, 11.5 ± 2.34 , 10.6 ± 1.92 and 9.75 ± 0.55 cm respectively as compared to normal caeca length of 16.9 ± 1.2 cm in the uninfected unmedicated control group. Comparison of caecal length between the groups revealed a marked reduction in groups A and D, while groups B and C had moderate caecal length and caecal score (++) . The caecal score in groups A and D was found to be severe and was graded as (+++).

Histopathological changes. Histopathological changes like cellular infiltration, inflammatory changes, hyperplastic changes, necrosis, presence of endogenous developmental stages of coccidia and sloughing off epithelial layers were observed in all the treatment groups. In addition to this, heavy infiltration of mononuclear cells with marked alteration of cellular integrity was observed in the control group. Although endogenous developmental stages of coccidia were observed in all the groups, intensity was found to be less in the Salinomycin treated group.

Discussion

Coccidial challenge significantly affected the body mass gain and feed conversion ratio of the chicks. It is evident that the body mass gain of uninfected unmedicated birds at 5th weeks of age was higher (461.86 ± 87.03 g) compared to 295.9 ± 39.65 g in the control group. The findings of the present investigation are not in agreement with the findings of KURKURE et al. (2006), who stated that coccidial challenge had no effect on body mass gain and feed conversion ratio. The birds treated with 10% herbal complex had better body mass gain (344.34 ± 59.81 g) and moderate feed conversion ratio (1.75 ± 0.30) despite the coccidial challenge, indicating herbal treatment might have mitigated damage to the intestinal cells rather than interfere with parasite multiplication. The above findings of the present study are akin to the findings of OH et al. (1995), who reported that extracts of *Artemisia annua* L were shown to improve body mass gain, lesion scores and feed conversion ratios in chicks infected with *E. tenella*. Similarly DU and HU (2004) also observed significantly higher body mass gains and mild lesion score in birds medicated with herbal complex for *E. tenella* infection in chicken.

Further, the birds that received 10% herbal complex showed a moderate lesion score and caecal length, endorsing the fact that herbal complex had some palliative effect against coccidiosis. But the oocyst per gram of faeces did not show much variation among the treated and control groups, except the Salinomycin treated group, which had low OPG. This might be due to the ionophoric antibiotic Salinomycin interfering with the biotic potential of *E. tenella* by altering the ionic status of the cells.

Histologically, the birds from the infected control group had severe cellular infiltration, necrosis and hyperplastic changes compared to all other groups. Hence bird mortality was only observed in controls and the birds that received 5% herbal complex. Results of the study indicate that the herbal complex at higher doses may have an anticoccidial effect, but further study is required to ascertain it.

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SAŽETAK

Protukokcidijska učinkovitost biljnoga pripravka sastavljenoga od biljaka *Solanum nigrum* 35%, *Aloe vera* 15%, *Moringa indica* 35% i *Mentha arvensis* 15% istražena je na tovnim pilićima invadiranim kokcidijom *Eimeria tenella*. Trideset jednodnevnih pilića bilo je podijeljeno u pet pokusnih skupina. U svakoj skupini bilo je šest pilića, koji su do pokusa bili hranjeni krmivom bez protukokcidijskih sredstava. Pilići skupina A, B, C i D bili su u dobi od 28 dana invadirani s 30 000 sporuliranih oocisti *E. tenella*. Pilići skupine E bili su neinvadirani i neliječena kontrola. Trećega dana nakon izazivačke invazije, pilićima skupina A i B primijenjen je biljni pripravak u količini od 5 do 10% tijekom sedam dana. Skupina C bila je istodobno hranjena krmivom s primiješanim salinomycinom. U pilića skupine B koji su u hrani dobivali 10%-tni biljni pripravak ustanovljen je bolji prirast u razdoblju od 4. do 5. tjedna ($344,34 \pm 59,81$ g), veća iskoristivost hrane ($1,77 \pm 0,43$ g) i srednja dužina slijepog crijeva $11,5 \pm 11,9$ cm. Nije ustanovljena značajna razlika u broju oocisti između obrađivanih skupina i kontrolne skupine. U neinvadirane i neliječene skupine prirast je iznosio $461,86 \pm 87,03$, FCR $1,70 \pm 0,46$, dok je dužina slijepog crijeva iznosila $16,9 \pm 1,2$ cm. Uginuća su zabilježena samo u skupini A i D.

Cljučne riječi: protukokcidijska učinkovitost, biljni pripravak, *Eimeria tenella*, tovni pilići
