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Efficacy of herbal powder against mixed *Eimeria* species infection in poultry

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Abstract
An experiment was conducted on one hundred and twenty, one day old broiler chicks to study the anticoccidial efficacy of 0.4% as well as 0.2% *Calotropis procera* (madar) leaf powder and 0.0125% amprolium supplementation. Experiment was conducted for 30 days. Chicks were randomly divided into five groups (I-V) each with two replicates of 12 chicks. Broilers of group I and II were provided standard control diet without any supplement. In broilers of group III, standard feed was supplemented with 0.0125% amprolium and broilers of group IV were provided with basal diet supplemented with 0.2% madar leaf powder. Broilers of group V were provided standard control diet supplemented with 0.4% madar leaf powder. On 15th day of experiment, broilers of group II, III, IV and V were infected with 50,000 sporulated oocysts of mixed *Eimeria* species. It was observed that amprolium had excellent efficacy against coccidiosis. Madar leaf powder supplementation also possessed very good efficacy against coccidiosis however it was lower than amprolium. So madar leaf powder may be used for the prevention and control of mixed *Eimeria* spp. infection prevalent in field conditions.

Keywords: poultry coccidiosis, anticoccidial efficacy, madar

1. Introduction
Poultry farming is a beneficial occupation but sometimes even after giving balanced diet and good housing conditions, desired production is not obtained due to the occurrence of diseases. Among these diseases coccidiosis is one of the most dangerous disease of poultry. The losses due to coocidiosis are mainly due to cumulative effect of lower feed intake, impaired feed conversion, depressed growth, loss of pigmentation and downgrading of processing and mortality (Bozkurt *et al*., 2013) [3]. Coccidiosis is mainly controlled by using chemical drugs (Shirley *et al*., 2005) [17] but use of these drugs for long time results in drug resistance as well as problem of drug residues in poultry products (Abbas *et al*., 2011; Habibi *et al.,* 2016) [1,6]. Due to these problems immunological approach for controlling coccidiosis were employed, but high cost and chances of reversal of pathogenecity of vaccines directed researchers in search of the new approach for control of coccidiosis. Plant products can be used to control coccidiosis as plants produce a broad-spectrum variety of phytochemicals with a large number of bioactivities (Muthamilselvan *et al.*, 2016) [15]. A well-known plant *i.e. Calotropis procera* (Madar) has many medicinal properties as antinflammatory, antidiarrhoel, antipyretic, antioxidant, hepatoprotective and anthelmintic (Kumar *et al*., 2013) [13]. Present experiment explained the anticoccidial efficacy of *Calotropis procera* (Madar) leaf powder in comparison to Amprolium.

2. Materials and Methods
Experiment was conducted in the College of Veterinary and Animal Sciences, G.B. Pant University of Agriculture and Technology, Pantnagar, for which necessary approval was taken from Institutional Animal Ethics Committee. For the experiment, 120, one-day old commercial broiler chicks were randomly allocated to five groups. The groups were designated as group I, II, III, IV and V. Each group had 2 replicates having 12 chicks. At the age of 5 days, vaccination against ranikhet disease and at 12 days, vaccination against gumboro disease were done using F_1 strain and Georgia strain vaccine, respectively. Feed and drinking water were provided *ad-libitum* to the broilers during the entire experimental period. Experiment was conducted for a period of 30 days. Coccidiostat free feed for the chicks was brought from local poultry feed supplier. Broilers of group I and II were provided standard control diet without any supplement. In broilers of group III, standard feed was supplemented with 0.0125% amprolium and broilers of group IV were provided with basal diet supplemented with 0.2% madar leaf powder.

Broilers of group V were provided standard control diet supplemented with 0.4% madar leaf powder.

To isolate the oocysts of *Eimeria sp.*, method described by Holdsworth *et al.* (2004) [9] was used with few modifications. Oocysts were washed with water before use and then the number of oocysts were counted in McMaster chamber (Davies *et al.*, 1963) [5]. *Eimeria* spp. mixed culture contained *E. tenella* (80%), *E. necatrix* (10%), *E. acervulina* (6%), *E. maxima* (2%) and *E. mitis* (2%), which were identified on the basis of guidelines of Levine (1985) [14]. At the age of 15 days, broilers of groups II, III, IV and V were infected by inoculating 1 ml suspension containing 50,000 sporulated oocysts of mixed *Eimeria* species directly in the pharynx, using a long nozzled 2 ml plastic pipette. Broilers of group I were inoculated with 1 ml plain water.

Mortality due to coccidiosis was recorded. 3 birds from each replicate were sacrificed on 5 days post infection. Lesion score (Johnson and Reid, 1970) [10] and oocyst index (Hilbrich, 1978) [8] were estimated and percent protection against lesion was calculated by using the following formula:

$$\text{Percent protection against lesion} = \frac{\text{Lesion score of control infected group} - \text{Lesion score of supplemented infected group}}{\text{Lesion score of control infected group}} \times 100$$

Average weight gain and average feed intake during entire experimental period were recorded and per cent weight gain was calculated by the formula below:

$$\text{Per cent weight gain} = \frac{\text{Mean weight gain of supplemented infected group}}{\text{Mean weight gain of control uninfected group}} \times 100$$

Feed conversion ratio (FCR) was estimated with following formula:

$$\text{FCR} = \frac{\text{Average feed intake during experiment (g)}}{\text{Average weight gain during experiment (g)}}$$

Anticoccidial efficacy of madar (*Calotropis procera*) leaf powder and amprolium were determined by calculating the global index (GI) as per the method of Stephan *et al.* (1997) [20]. The global index (GI) was determined by the formula:

$$GI = \% WG_{NMNI} - [(F_M - F_{NMNI}) \times 10] - (OI_M - OI_{NMI}) - [(LS_M - LS_{NMI}) \times 2] - (\% \text{ Mortality}_M / 2)$$

Where,
GI - Global index,
WG -Weight gain,
F - Feed conversion ratio,
OI - Oocyst index,
LS - Lesion score,
M - Medicated infected group,
NMNI - Non-medicated non- infected control,
NMI - Non-medicated infected control

The global index was expressed in percentage in comparison to that of non-infected non- medicated control. The efficacy was assessed by categorizing the global index percentage as follows:

Very good efficacy ≥ 90% $GI_{NMNI,}$ Good efficacy ≥ 80% $GI_{NMNI,}$ Limited efficacy ≥ 70% $GI_{NMNI,}$ Partially resistant ≥ 50% $GI_{NMNI,}$ Resistant < 50% GI_{NMNI}

Where, GI_{NMNI} is global index of non-infected non-medicated control.

Ooocyst index, lesion score and per cent protection against lesion were subjected to statistical analysis using one-way ANOVA technique described by Snedecor and Cochran (1994) [19].

3. Results and Discussion

The results of the study are tabulated in table 1. Among infected groups per cent weight gain was maximum in amprolium supplemented group which showed non-significant difference with 0.4% madar leaf powder supplemented group, whereas it was minimum in control infected group. Feed conversion ratio among all groups was maximum in control infected group and minimum in control uninfected group, whereas among supplemented infected groups it was better in amprolium supplemented group which was non-significantly different to 0.4% madar leaf powder supplemented group. Higher per cent weight gain in infected madar leaf powder supplemented groups may be due to its anticoccidial and antioxidant property (Joshi *et al*, 2009) [11]. Average oocyst index was 3.17 in broilers of infected untreated group, which was significantly lower in supplemented groups. Amprolium supplemented group (0.88) had lowest oocyst index which varied non-significantly from that of 0.4% madar leaf powder supplemented group (1.04). Oocyst index of 0.2% madar leaf powder supplemented group (1.17) differed non-significantly to that of 0.4% madar leaf powder supplemented group ($P \leq 0.05$). Zaman *et al.* (2011) [22] also observed non-significant difference in oocyst index between *Calotropis procera* containing herbal complex treated and amprolium treated broiler groups after introduction of coccidiosis infection.

Table 1: Efficacy of different supplementations against poultry coccidiosis-

Groups		*% Weight gain	*Feed conversion Ratio	*Oocyst index	*Lesion score	*Mortality %	*Per cent protection against lesion	Global index	% Global index
III	IA	93.89^{b}	1.54^{c}	0.88^{c}	0.46^{c}	0^{b}	87.73^{a}	108.67	98.19
IV	IM-1	89.20^{c}	1.59^{b}	1.17^{b}	1.33^{b}	4.16^{b}	64.53^{c}	104.06	94.03
V	IM-2	93.44^{b}	1.55^{c}	1.04^{bc}	1.13^{b}	4.16^{b}	69.87^{b}	104.99	94.87
II	IC	71.35^{d}	1.76^{a}	3.17^{a}	3.75^{a}	25.00^{a}	00^{d}	-	-

I	UC	100[a]	1.52[d]	-	-	-	-	110.67	100
* Significant		a, b, c, d Means bearing different superscripts in a column differ significantly ($P \leq 0.05$)							
Where, IA = Infected supplemented with Amprolium				IM-1 = Infected supplemented with 0.2% Madar leaf powder					
IM-2 = Infected supplemented with 0.4% Madar leaf powder				IC = Infected Untreated Control			UC = Uninfected Untreated Control		

Average lesion score was significantly higher in broilers of group II (3.75) and significantly lower in broilers of group III (0.46) while group IV (1.33) and group V (1.13) had non-significantly different average lesion score. Percent mortality was significantly higher in control infected group, whereas it was zero for amprolium supplemented group. Biu *et al.* (2006) [2] also noticed zero per cent mortality rate in amprolium supplemented broilers against mixed *Eimeria* spp. oocysts. In present study, 0.2% as well as 0.4% madar leaf powder supplemented groups showed non-significant difference to amprolium supplemented group in terms of per cent mortality. Hady and Zaki (2012) [7] also observed higher mortality in control infected groups and decrease in percent mortality with the use of herbs. Per cent protection against lesion was zero for the broilers of group II and maximum ($P \leq 0.05$) in amprolium supplemented group (87.73) and it was also noticed that 0.4% madar leaf powder supplemented group *i.e.* group V (69.87) had significantly higher percent protection against lesion than 0.2% madar leaf powder supplemented group *i.e.* group IV (64.53). Lower lesion score in madar leaf powder supplemented group may be due to its antiulcer and antinflammatory property (Kshirsagar *et al.*, 2008; Patil *et al.*, 2011) [12, 16]. Zaman *et al.* (2011) [22] also observed similar results.

Global index and % global index were maximum in broilers of amprolim supplemented group (108.67 and 98.19, respectively), minimum in broilers of 0.2% madar leaf powder supplemented group (104.06 and 94.03) and intermediate in broilers of 0.4% madar leaf powder supplemented group (104.99 and 94.87, respectively). Results showed that amprolium had highest efficacy against coccidiosis. Madar leaf powder supplemented groups although had lower efficacy than amprolium, but they also possessed very good efficacy against coccidiosis. Singh *et al.* (2006) [18] also used global index as a method to compare efficacy of different medications.

These results showed the effectiveness of amprolium and madar leaf powder for control of coccidiosis. Anticoccidial effect of madar leaf powder may be attributed to its anticoccidial property due to its saponin content, which act on the protozoan development by interacting with cholesterol present on the parasitic cell membrane and resulting into parasitic death (Wang *et al.*, 1998; Zaman *et al.*, 2011) [21,22] and phenols and flavonoids contents, which contribute to its antioxidant property and limit *Eimeria* induced damage to the intestinal wall during pro-inflammation reaction and resulting in less damage to the gut (Bozkurt *et al.*, 2013) [3]. Antidiarrhoeal and antiulcer property of madar leaf powder also contributed to its anticoccidial effect (Chitme *et al.*, 2004; Kshirsagar *et al.*, 2008) [4, 12].

4. Conclusion

From the present study it was concluded that herbal powder of madar leaf is effective in the prevention and control of mixed *Eimeria* spp. infection in poultry.

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6. References

1. Abbas RZ, Iqbal Z, Blake D, Khan MN, Saleemi MK. Anticoccidial drug resistance in fowl coccidia: the state of play revisited. World Poultry Sci J 2011;67:337-350.
2. Biu AA, Yusuff SD, Rabo JS. Use of neem (*Azadrichata indica*) aqueous extract as a treatment for poultry coccidiosis in Borno State, Nigeria. Afr Sci 2006;7(3):147.
3. Bozkurt M, Giannenas I, Kuçukyilmaz K, Christaki E, Florou-Paneri P. An update on approaches to controlling coccidia in poultry using botanical extracts. Br Poultry Sci 2013;54(6):713-727.
4. Chitme HR, Chandra R, Kaushik S. Studies on anti-diarrhoeal activity of *Calotropis gigantea* R.Br. in experimental animals. J Pharm Pharmaceutical Sci 2004;7:70-75.
5. Davies SFM, Joyner LP, Kendall SB. Coccidiosis. 1st ed. Oliver and Boyd Ltd., Edinburg, 221, 1963.
6. Habibi H, Firouzi S, Nili H, Razavi M, Asadi SL, Daneshi S. Anticoccidial effects of herbal extracts on *Eimeria tenella* infection in broiler chickens: *in vitro* and *in vivo* study. J Par Dis 2016;40(2):401-407.
7. Hady MM, Zaki MM. Efficacy of Some Herbal Feed Additives on Performance and Control of Cecal Coccidiosis in Broilers, APCBEE Procedia 2012;4:163-168.
8. Hilbrich P. Krankheiten des Geflugels unter besonderer berucksichtigung der Haltung and Futterung. Hermann Kuhn KG, Schwenningenam Necar, Germany 1978.
9. Holdswort PA, Conway DP, McKenzie ME, Dayton AD, Chapman HD, Mathis GF *et al*. World Association for the Advancement of Veterinary Parasitology (WAAVP) guidelines for evaluating the efficacy of anticoccidial drugs in chickens and turkeys. Vet Parasitol 2004;121:189-212.
10. Johnson J, Reid NM. Anticoccidial drugs: Lesion scoring techniques in battery and floor pen experiments with chickens. Exp Parasitol 1970;28:30-36.
11. Joshi R, Sharma A, Lal B. Analysis of antioxidant activity in extracts of *Calotropis procera* (Ait.) R.Br, J Appl Biosci 2009;17:899-903.
12. Kshirsagar A, Patil PA, Ashok P, Hulkoti B. Anti-inflammatory and anti-ulcer effects of *Calotropis gigantean* R.Br flowers in rhodents. J Nat Rem 2008;8(2):183-190.
13. Kumar PS, Suresh E, Kalavathy S. Review on a potential herb *Calotropis gigantea* (L.) R. Br., Sch. Acad J Pharm 2013;2(2):135-143.
14. Levine ND. Veterinary protozoology. Iowa State University Press, Ethopia 1985, 414.
15. Muthamilselvan T, Kuo T, Wu Y, Yang W. Herbal Remedies for Coccidiosis Control: A Review of Plants, Compounds, and Anticoccidial Actions. Evid Base Compl Alternative Med 2016, 1-19.
16. Patil P, Prasad K, Nitin M, Kumar VM, Rao SK. Evaluation of anti-ulcer and anti-secretory properties of

the *Calotropis procera* root extract. RJPBCS 2011;2(3):35-42.
17. Shirley MW, Smith AL, Tomley FM. The biology of avian *Eimeria* with an emphasis on their control by vaccination. Adv Parasitol 2005;60:285-330.
18. Singh VS, Garg R, Yadav CL, Kumar R, Banerjee PS, Yadav AP. Efficacy of combination of sulphadiazene and trimethoprim against poultry coccidiosis. J Vet Parasitol 2006;20(1):73-75.
19. Snedecor GW, Cochran WG. Statistical Methods. VIII edn. Iowa University Press, Iowa, U.S.A 1994.
20. Stephan B, Rommel M, Daughschies A, Haberkorn A. Studies of resistance to anticoccidials in *Eimeria* field isolates and pure *Eimeria* strains. Vet Parasitol 1997;69:19-29.
21. Wang Y, Mcallister TA, Newbold CJ, Rode LM, Cheeke PR, Cheng KJ. Effects of *Yucca schidigera* extract on fermentation and degradation of steroidal saponins in the rumen simulation technique (RUSITEC). Ani Feed Sci Tech 1998;74:143-153.
22. Zaman MA, Iqbal Z, Abbas RZ, Khan MN. Anti-coccidial activity of herbal complex in broiler chickens challenged with *Eimeria tenella*. Parasitol 2011;139(2):237-243.