Anticoccidial activity of different forms of *Aloe vera*  

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**ABSTRACT**  

The aim of the present study was to evaluate the anticoccidial efficacy of three different forms of *Aloe vera* including powder form, aqueous and methanol extracts. Although powdered and aqueous forms of *Aloe vera* also exhibited anticoccidial activity but its methanol extracts at higher concentration (4g) showed better weight gain and less oocyst per gram count in comparison of Amprolium (anticoccidial drug). We concluded that due to its anticoccidial activity *Aloe vera* can contribute to minimize the use of growth promoter antibiotics in poultry feed.  

**Key words:** Aloe Vera, Amprolium, Aqueous and methanol extracts, Eimeria.  

Coccidiosis is an enteric disease of poultry caused by protozoan parasites of genus *Eimeria*. It causes huge production losses due to increased morbidity and mortality and its control mainly depends upon the use of anti-coccidial drugs (Arabkhazaeli et al., 2013). The excessive or repetitive prophylactic use of anticoccidial drugs is not only costly but also renders poultry prone to development of drug resistance (Cervantes, 2015). Therefore untoward results of resistance development due to anti-coccidial drugs have prompted researchers to devise alternative approaches to control the disease. In past *Aloe vera* gel has been used for suffice multiple purposes, like an antibiotic, anti-inflammatory, for healing of wounds, and as an anti-ulcer agent. It has also been reported that in broilers it increases immunity by enhancing the number of microflora (Darabighane et al., 2012). As the use of ethnoveterinary medicines plays an important role in curbing the problem of drug resistance. *Aloe vera* used in present study could be a better option to replace coccidiostats and coccidiocides. Keeping in view this hypothesis, the present study was planned with an objective to estimate anticoccidial activities of different preparations of *Aloe vera*. The parameters studied were the decreases in oocysts per gram and increase in weight gain of broiler birds.  

*Aloe vera* was procured from local market of Lahore and then identified and authenticated by Department of Botany, University of Punjab, Lahore, Pakistan.  

**Preparation of aqueous extract:** Leaves of *Aloe vera* were shade dried, grounded finally in powder in electric grinder, and preserved at 4°C in a bag. The extracts were formulated by following the standard methods (Onyeyili et al., 2001). Hundred gram grounded plant material was mixed in 500 mL of distilled water in a round bottom flask and was boiled for 1.5 hrs. This mixture was left to cool at 40°C and was filtered by using Whatman No. 1 filter paper. This filtrate was concentrated at 4°C by using rotatory evaporator and was preserved until used.  

**Preparation of methanol extracts:** Grinded *Aloe vera* was extracted with the help of methanol by using Soxhlet apparatus (Asuzu and Onu, 1994). The extract was evaporated at 4°C and preserved until required.  

**Experimental Animals and study groups:** A total of 90 broiler birds (14 days of age) were divided into nine groups containing 10 birds each. The birds were fed with coccidiostat free experimental feed, procured from Crescent Feed Mills Private Limited. The birds were vaccinated with New Castle Disease (ND) and Infectious Bronchitis (IB) at day 1, Infectious Bursal Disease (IBD) at day 8 and then ND at 14 day. Different treatments assigned to different groups were as follow.  

Group 1: Negative control  
Group 2: Positive control  
Group 3: Treated with Amprolium-60 1g/ 2 lit of water  
Group 4: Birds administered with aqueous extract of *Aloe vera* (equivalent dose rate of 2 gm/Kg Body Weight (B.W).  
Group 5: Birds administered with aqueous extract of *Aloe vera* (equivalent dose rate of 4 gm/Kg of B.W)  
Group 6: Birds administered with methanol extracts of *Aloe vera* (equivalent dose rate of 2gm/Kg of B.W)  

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Group 7: Birds administered with methanol extracts of *Aloe vera* (equivalent dose rate of 4gm/Kg of B.W)  
Group 8: Birds administered with *Aloe vera* in powder form (equivalent dose rate of 2gm/kg of B.W)  
Group 9: Birds administered with *Aloe vera* in powder form (equivalent dose rate of 4gm/kg of B.W)

**Identification and counting of oocysts:** To collect various species of *Eimeria*, small and large intestines were procured from various commercial poultry shops of Tolinton Market, Lahore. The positive cases were separated for extraction, sporulation and identification of oocyst(s) through classical method of microscopy (Foreyt, 2013). The oocysts were preserved in 2.5% potassium dichromate solution. This suspension was filtered through muslin cloth and allowed to sediment. The supernatant was discarded and the sediment was re-suspended in 2.5% potassium dichromate solution for sporulation of oocyst. The sediment was mixed with saturated solution of sodium chloride and was centrifuged at 1500 rpm for 2 minutes. McMaster technique was used for counting of oocyst (Gibbons *et al*., 2016).

**Parasite and dose:** Each bird was given mixed infection of 50,000 sporulated *Eimeria* oocysts at 17th day of age except negative control. The dose was calculated by counting oocysts through McMaster technique as described before (Chapman *et al*., 1982).

**Efficacy parameter:** The oocyst per gram (OPG) count of the droppings after infection were measured by McMaster counting technique (Maff,1979) on 0, 3rd, 7th and 10th days after initiation of oral administration of equivalent dose rate of 2 and 4 gm of *Aloe vera* Kg of B.W in powdered form and its aqueous and methanol extracts.

**Statistical analysis:** By using statistical technique ANOVA the data was analyzed with the help of a statistical program SPSS version 21.

Coccidiosis is mainly controlled by use of anticoccidal drugs in field conditions that result in dilemma of drug resistance. Therefore to overcome this problem plants and their extracts can be considered for research to determine their anticoccidial activity. Keeping in view the wide range of *Aloe vera* activities the present study was conducted to see its anticoccidial effects.

The negative control (group A) showed no oocysts because there was no induction of infection in it to ensure coccidian free birds while in positive control the oocyst per gram (OPG) continued to increase due to absence of any treatment. In the experimental groups the oocysts patency started at the age of 21days after inducing of infection at the age of 17th day (Fig 1). As *Eimeria tenella* has 96-120 hrs incubation period therefore it took about four days for appearance of oocyst in faeces. Group 3 which was treated with Amprolium (A drug of choice for coccidia) showed increased reduction in number of oocysts at 3rd day, 7th day and 10th day post-treatment. While in other groups the effect of *Aloe vera* was according to concentration and form used.

Though there have been few studies on effect of *Aloe vera* against coccidiosis in poultry (Yim *et al*., 2011; Akhtar *et al*., 2012) but the efficacy of its different forms have not been evaluated before. The results of present study showed that *Aloe vera* in all forms used (either in powder form or aqueous or methanol extract) has anti-coccidial effect in broilers by decreasing OPG. Although powdered form and aqueous extracts showed non-significant results but 4gm methanol extract was most effective among all test groups and can be comparable with synthetic drug of choice (amprolium) against coccidiosis (Fig 2). It is in agreement with studies of Akhtar *et al*., (2012) who found better immunostimulatory effect of ethanolic extract of *Aloe vera* than its aqueous extract in broiler chickens infected with *Eimeria*. Similarly our results can be supported by the
findings of Iqbal et al. (2012) who also found maximum activity of methanol extract of Aloe vera against Leishmania. This could be due to more killing and toxic effect of methanol.

Moreover, the decline in OPG was non-significantly dose dependent for all forms of Aloe vera. The results showed that there was not a significant change in weight gain at 3rd and 7th day while at 10th day there was a significant increase in weight of group 7 (given higher concentration of methanol) and it was comparable with group 3 (given amprolium that is a drug of choice for coccidiosis) (Fig 3). This may be due to enhanced activity of aloeride (a polysaccharide from Aloe vera) when it reacts with methanol as compare to water. However, it will be premature to say it without further research. On other hand this is in contrast to the studies of Yim et al., (2011) who found no significant effect of Aloe vera on weight gain of broiler chickens infected with Eimeria maxima. This may be due to differential activity of Aloe vera against different Eimeria species as in present study we infected the birds with E. trenella. In conclusion we can say that due to its availability and effectiveness Aloe vera may be used commercially for control of coccidiosis.

REFERENCES


