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Experimental *Eimeria necatrix* infection: Comparative efficacy of sulphadimidine, amprolium and septrin in cockerels

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ABSTRACT: The efficacy of amprolium, septrin and sulphadimidine in controlling *Eimeria necatrix* infection was determined using experimental infected cockrels. The infection was characterised by weight loss, anaemia, dullness, bloody diarrhoea and death. Of the three drugs, septrin was found to be most effective in the treatment of the disease followed by sulphadimidine and amprolium as evidenced by the amelioration of clinical signs, gross and histopathological lesions and relative survival rates of treated birds. Septrin, though not popular as an anticoccidial agent, is recommended for the treatment of coccidiosis due to *E. necatrix* in Maiduguri, Nigeria. None of the drugs was able to eliminate the oocysts completely from the birds. These findings underline the need to undertake further research into the efficacy of the other anticoccidial drugs in use as this might have dropped due to drug resistance and abuse.

Key Words: Coccidiosis; *Eimeria necatrix*; Drug efficacy; Drug resistance, Chickens; Cockerels.

Introduction

Coccidiosis, an infectious disease of poultry, is universal in spread and may involve 5 – 10% mortality rates in poultry flocks with a considerable economic loss (McDougald and Reid, 1991). The disease caused by a protozoan of the genus *Eimeria* is acquired by ingestion of sporulated oocysts which then establish in the intestinal tract to cause tissue damage, dehydration and blood loss (Molta *et. al.* 1998).

In Nigeria, poultry coccidiosis seems to be a disease of secondary importance in indigenous chickens (Saidu *et. al.*, 1994 and Akpavie. 1998). However, with the poultry industry in Nigeria now geared towards high scale mass production, there is the tendency of a serious threat from the persistent increase in the incidence and prevalence of the disease in the country (Akpavie, 1998).

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Management of coccidiosis in by use of drugs and vaccines (Akpavie, 1998), and drug resistance has been reported from parts of the world (Brander and pugh, 1991); but there is no similar report in this study area on the susceptibility of *Eimeria* parasites to the commonly used anticoccidials and hence the interest to find out the efficacy of these anticoccidials (amprolium, sulphadimidine and septrin) on the *Eimeria* parasites of domesticated local chicken and to make recommendations regarding the best of the anticoccidials currently available in this semi-arid zone of Northeastern Nigeria.

Materials and Methods

The comparative efficacy of sulphadimidine, amprolium and septrin the commonly used anticoccidials in this study area was investigated using cockerels experimentally infected with *Eimeria necatrix*.

The body weight of each cockerel was measured every four days using a three tin balance to record variations. Similarly, packed cell volume (PCV) of each cockerel was determined after every 4 days using the microhaematocrit technique (Anon, 1984). Also fecal examination using the saturated salt flotation technique was conducted to rule out or detect coccidial infections. The metoods used to obtain the *Eimeria* parasites involved the introduction of 2 out of the 40 cockerels to be examined on deep litter contaminated with infected poultry feaces. The cockerels became infected after 3 weeks. The parasites were then isolated and identified using their sporulation time, oocyst shape and size and the nature of intestinal lesion upon post mortem examination (Soulsby, 1982). The uninfected cockerels were then used with 2ml suspension containing 130,000 sporulated oocysts orally using a plastic syringe who subsequently became fully infected after 3 weeks. The infected cockerels were then divided into 3 groups with the 1st group given 0.2% sulphadimidine (500mg) orally in drinking water as recommended by Brander and Pugh (1991). Group 2 was administered amprolium orally at 0.125% concentration while Gorup 3 was given septrin at 0.02% concentration. Group 4 was used as infected control while group 5 was kept as unaffected control which received water by the same route in place of oocysts. Necropsy was performed on dead birds.

Statistical Analysis

Data were analysed by means of student t – test, ANOVA and Duncan multiple range test. P values less or equal to 0.05 were considered significant.

Results

The results of this study revealed that among the drugs tried septrin had the highest efficacy showing a 0.0% mortality rate when used on *E. necatrix* infected birds with sulphadimidine and amprolium showing a reduced efficacy with mortality rates of 33.3% and 50.0% respectively (Table 1).

Table 1: The mortality pattern of birds experimentally infected with *Eimeria necatrix* and treated with different drugs.

Drug	No. birds	No. dead	Percentage
Sulphadimidine	3	1	33.3
Amprolium	4	2	50.0
Septrin	4	0	0
Water	4	0	0
Control	4	0	0

The mean packed cell volume (PCV) of the birds experimentally used in this study are represented in Fig.1. The sulphadimidine treated birds showed a reduction in their mean PCV value from 30% to 28% on day 4 post infection then to 20% on day 8 which was significant ($P < 0.05$). Those birds treated with amprolium showed a drop in the PCV values from 27% to 26% on day 4 post infection which, however, remained constant up to day 8; the drop was however not significant ($P > 0.05$). In septrin treated birds the mean PCV value dropped from the pretreatment value of 30.5% to 24.5% on day 8 post infection which was quite significant ($P < 0.05$). The figure also shows the PCV value for the experimentally infected but not treated birds which significantly ($P < 0.05$) dropped from a pre-infection value of 30.3% to 25.6% on day 8 post infection.

Figure 2 shows the mean weight of the birds studied. There was a fall on the mean weight of sulphadimidine treated birds from 921.7g to 887.1g on day 4 post infection. In the amprolium treated birds the weight decreased from 1014.6g to 947g on day 8 post infection while in the septrin treated birds the mean body weight increased from day 0 upto the 16th post infection i.e. 1015.4g to 1232.5g. Birds experimentally infected but not treated showed a loss of weight from 1024.3g pre-infection to 893.5g on day 4 post infection. For the control there was rather a gradual increase in weight from 1053.6g on day 0 upto 1347.2g on day 16.

The mean oocyst counts of the birds are indicated in Figure 3. Birds treated with sulphadimidine showed a decrease from 164,000 oocyst per gram (opg) on day 4 post infection to 100 opg on day 16 post infection, while those treated with amprolium showed an opg of 320,000 on day 4 post infection which was reduced to 600 opg on day 16 post infection. In septrin treated birds the opg was 35500 on day 4 post infection which was drastically reduced to 100 on day 16 post infection. In the control group there was however a gradual increase in opg from 28,000 on day 4 post infection to 1,436,000 opg on day 8 post infection. The opg value decreased progressively thereafter to 100,000 by day 10 post infection. The infection was characterised by haemorrhagic inflammation of the intestinal mucosa, thickening of the intestinal wall and necrosis of mucosal epithelium. Lesions were less severe in septrin treated birds, followed by sulphadimidine treated ones and worst in those not treated at all.

Discussion

The efficacy of sulphadimidine, amprolium and septrin was investigated using chickens experimentally infected with *Eimeria necatrix*. Parasites produced disease after an incubation period of 3 days which confirms the report by McDougald and Reid (1991) indicating the prepatent period of infection to be about 4 days; but the prepatent was however shorter than the 5 days given by Soulsby (1982). The infection was characterised by bloody diarrhoea, anorexia, pale combs and wattles and loss of weight which are all consistent features of coccidiosis due to *E. necatrix* (Gordon and Jordan, 1982).

The anaemia is due to blood loss as a result of necrosis of mucosal epithelium (McDougald and Reid, 1991), while emaciation could be due to maldigestion and malabsorption due to intestinal damage by the parasites. It may also be related to the inappetence observed in this study and reported earlier by other workers (Gordon and Jordan, 1982).

Although none of the drugs was able to clear the infection completely (as evidenced by the presence of oocysts in the faeces of birds) after 7 days of treatment, septrin proved to be the best of all of them. Septrin is not popular as anticoccidial agent (Brander et. al.; Akpavie, 1998). Its efficacy was probably enhanced by its property as a systemic sulphonamide which can control systemic infection and mucosal damage as a result of bacterial involvement.

Our findings underscore the need to carry out further drug trials; meanwhile, the use of septrin should be encouraged in this study area.

References

- Anon (1984). Manual of Veterinary Investigation and Laboratory technique vol. 2, Min of Agric. Fish and Stationery Office, London.

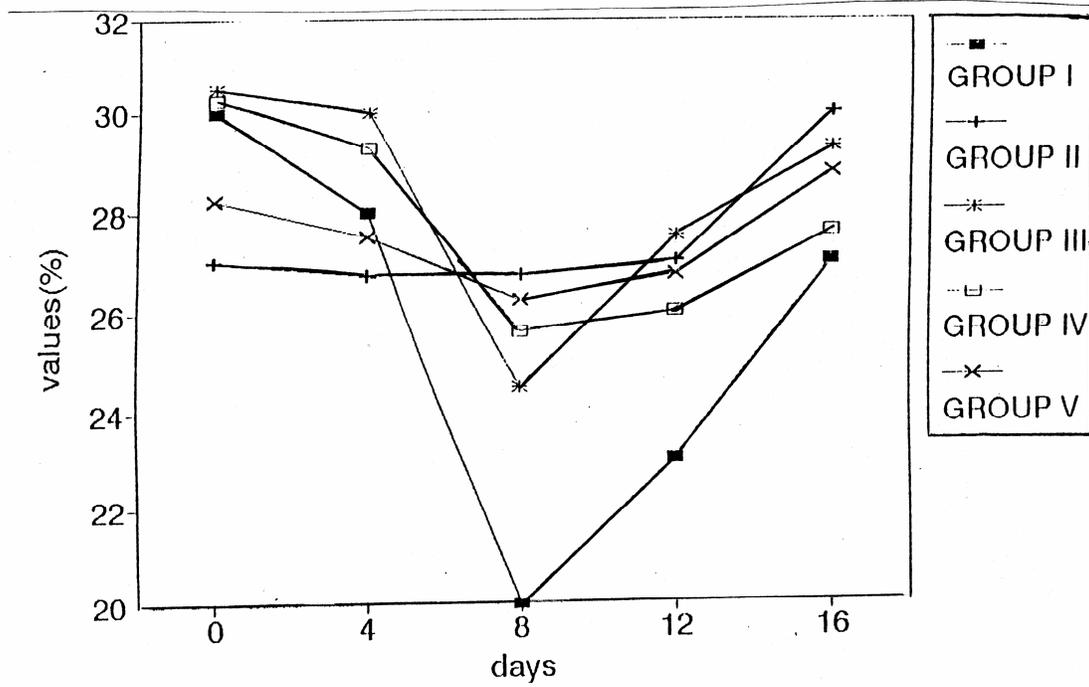


Fig. 1: The effect of coccidiosis on packed cell volume of chickens infected with *Eimeria necatrix*.

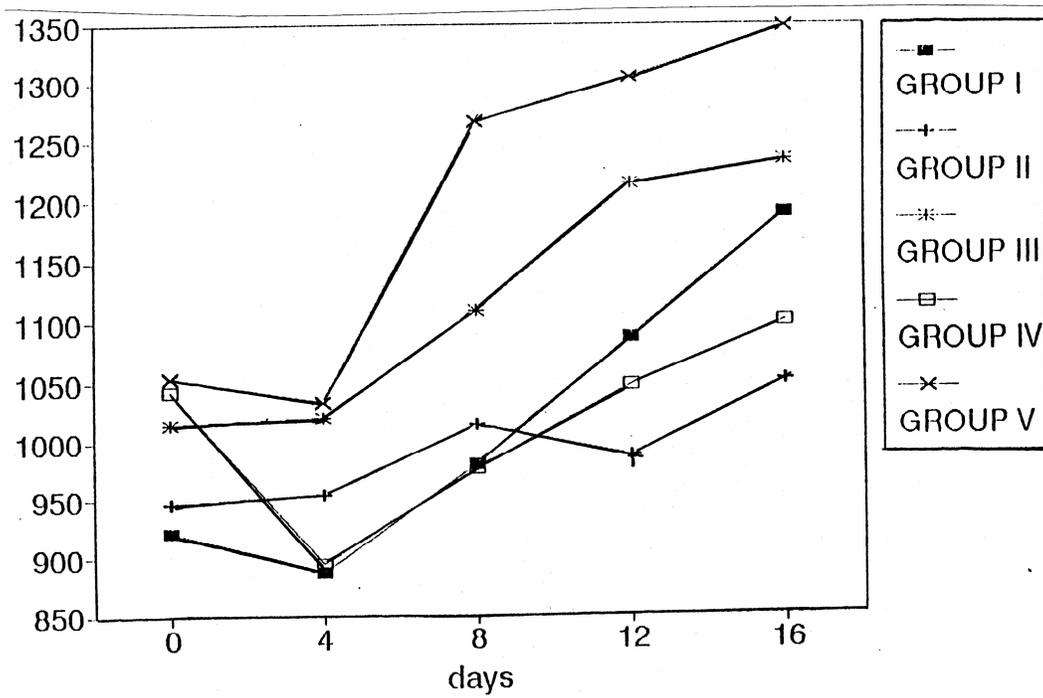


Fig. 2: The effect of coccidiosis on the mean weight of chickens infected with *Eimeria necatrix*.

- Akpavie, S.O. (1998). The biology, field presentation and approach to enhanced diagnosis of coccidiosis, paper presented at the 1998 animal Care Konsult Services NVMA Seminar, October, 1998, Abuja, Nigeria.
- Molta, N.B.; Bui, A.A. and Mohammed, M.I> (1998). Prevalence of *Eimeria* species of local breed of chicken in Maiduguri, North Eastern Nigeria. Annals of Borno, Accepted 1998.
- Brander, G.C. Pugh, D.M., Bywater, R.J. and Jenkins, W.L. (1991). Veterinary Applied pharmacology and Therapeutics 5th edition, Baillier tindall, London.
- Gordon, R.F. and Jordan, J.F. (1982). Poultry Diseases 2nd edition, Bailliere Tindall London.
- McDougal, L.R. and Reid, W.M. (1991). Coccidiosis. In: Diseases of Poultry. Calmek, B.W. ed. 9th ed., Iowa State Univ. Press, Ames, Iowa, U.S.A. pp. 780 – 797.
- Siadu, L. Abdu, P.A. Umoh, J.U. and Abdullahi, U.S. (1994). Diseases of Nigerian Indigenous chickens Bull. Amin. Hith Prod. Afric. 42: 19-23.
- Soulsby, E.J.L. (1982). Helminths, Arthropods and Protozoa of Domesticated Animals. 7th ed. Bailliere Tindall. Pp 595 – 671.