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Full Length Research Paper

Efficacy of Crude Water Extract of *Albizia anthelmintica* Bark Against *Raillietina tetraqona* Infection in Chicks

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The efficacy of *Albizia anthelmintica* bark against experimental *Raillietina tetragona* infection in poultry was evaluated in this study. Thirty six, one day-old male Lohmann layer chicks were purchased and reared at the premises of the Faculty of Veterinary Science, University of Khartoum, Sudan. The birds were randomly divided into three groups of twelve birds each (Group 1, 2 and 3). All birds in each group were experimentally infected with the infective stage of the parasite at a dose rate of three cysticercoids administered orally. Three weeks post-infection, Group 1 was kept as infected untreated control birds, where as group 2 and 3 were treated with oral administration of *Albizia anthelmintica* at a concentration of 20 and 40%, respectively. No noteworthy clinical manifestations or mortalities were observed either in chicks infected with *R. tetragona* or those treated with the aqueous extract of *Albizia anthelmintica* bark prepared at a concentration of 20 or 40%. At the end of the experiment all birds in the three groups were slaughtered. Necropsy findings were recorded and blood samples were collected for biochemical analysis. The scientific data presented in this study indicated that oral administration of *Albizia anthelmintica* at a concentration of 20 or 40% resulted in efficacy ranging between (16.6-50%) as judged by adult warms recovery, fecal eggs counts and by comparison of lesions in treated chicks and untreated infected controls. It is recommended that crude *Albizia anthelmintica* bark extract could be used for treatment of *R. tetraqona* infection in susceptible birds. Further studies are needed to identify the active ingredient and to elucidate the mode of action of this plant extract as an anticestodal drug for effective treatment of experimental *R. tetragona* infection in susceptible chicks.

Keywords: *Albizia anthelmintica*, R. tetraqona, poultry cestodes, Chemotherapy

INTRODUCTION

There has been a growing awareness in the chemotherapy of cestode parasites in man and poultry over the last thirty years. A number of synthetic drugs have been manufactured and used for the treatment of cestode infection (references). However, the Western medicine is so expensive that a large proportion of the population can not afford to purchase the prescribed medicine. Thus, traditional medicine is commonly practiced in remote rural areas of the Sudan. Efforts must, therefore, be exerted to make Sudan self-supporting as to this aspect by encouraging the production, collection and manufacture of local plant extracts and by making pharmaceutical preparations in an appropriate manner.

Albizia anthelmintica, a popular medicinal plant locally known as Girf Eldoud, is used for the treatment of helminth parasites in man and animal in Western Sudan. For this reason, experiments were conducted to measure the relative anticestodal activity and other properties of *Albizia anthelmintica* bark in eliminating *Raillietina tetragona* infection in chicks. In the Sudan, *R. tetragona* is considered a common poultry cestode of the small

intestine which causes severe enteropathy (Molin, 1958). The objective of the present study was to evaluate the efficacy of crude extract of *Albizia anthelmintica* bark as an anticestodal drug against experimental *R. tetragona* infection in chickens.

MATERIALS AND METHODS

Experimental Birds

Thirty six, one day-old male Lohmann layer chicks were purchased from the Sudanese African poultry Company, Bagair. Gazira State and reared at the premises of the Faculty of Veterinary Science, University of Khartoum, Sudan. The experimental birs were kept in enclosed facility, provided with starter ration with free access to water. The chickens were then assigned at random to 3 groups (twelves birds each). Group 1 was kept as infected untreated controls. Albendazole (Avico, Amman, Jordan) thereby was started 3 weeks post-infection and the drug was given in drinking water for 3 consecutive days at a dose rate of 2.5 and 25 mg/kg/day for group 2 and 3, respectively. All chicks in group 1, 2 and 3 were slaughtered after 7 days from the cessation of albendazole treatment.

Infective Materials

Cysticercoids of *R. tetragona* were obtained from the intermediate hosts, naturally-infected adult ants of the genus Tetramorium (*T. caespitum and T. Semilaeve*) found in poultry farms around the Faculty of Veterinary Science at Shambat. The ants were brought to the laboratory of Veterinary parasitology in empty clean bottles, transferred to a mortar containing normal saline and were mechanically disintegrated to release cysticercoids from the intestines (Soulsby, 1968). The cysticercoids were counted individually under the dissecting microscope, placed in gelatin capsules and given at appropriate dose to chicks by the oral route.

Necropsy findings

At the end of the experiments all chicks were slaughtered. The tape worms were recovered from chicks' intestines and counted individually. Specimens of intestines, liver, heart, kidneys and spleen were fixed in 10% formol-saline and processed for histopathological examination. Samples of blood were obtained from chicks at slaughtering. Total serum protein concentrations were measured using a commercial Kit (Arcomex, Arab Company for Medical Diagnostics, Amman, Jordan).

RESULTS AND DISCUSSION

When *Albizia anthelmintica* crude water extract was provided to chicks at 20% or 40% the efficacy ranged from 16.6–50%. The pathological changes in chicks infected with various levels of infection (2-6 cysticercoids/chick) were similar to those previously described. Lesions in chicks treated with *Albizia anthelmintica* crude water extract at 20 or 40% were not different from the infected controls and parts of scolicial structures were observed in the heavily-infiltrated intestinal Lamina propria. The concentration of serum total protein was higher ($P<0.05$) and that of total lipid was lower ($P<0.05$) in chicks on 40% Albidia crude water extract for 3 days (groups 2) than chicks infected with 3 cysticercoids/chick (group 1). There were significant differences in phosphorus ($P<0.05$) and total cholesterol ($P < 0.01$) between chicks infected with 2 cysticercoids/chick (group 5) and chicks on 20% Albizia water extract for one day (group 6) although other parameters did not change. There were no significant differences in Hb, PCV, RBC, MCV or MCHC values between chicks infected with various levels of infection 2–6 cysticercoids/chick and chicks on 20% *Albizia anthelmintica* crude water extract for one day. The lesions in chicks given various levels of infection at 6, 3 and 2 cysticercoids/chick were not different and they were similar in extent to those described in relation to treatment with Albizia crude water extract at 20 or 40%.

Efficacy measurements of the crude water extract of *Albizia anthelmintica* at a concentration of 20% or 40% were based on comparisons of reductions in worm burden. The short-term treatment of R. tetragona-infected chicks with these extracts resulted in efficacy ranging between 16.6% and 50%. This finding reflects low levels of effectiveness in the crude water extract of *Albizia anthelmintica* bark. The data provided have shown that *Albizia anthelmintica* infection in chicks variably responded to the ingestion of dietary *Albizia anthelmintica* bark with the production of efficacy range between 16-50%. The results also indicate that neither crude water extract of the plant bark nor powdered plant product in the diet caused toxic manifestations in chicks. It is interesting to note that although the anthelmintic efficacy of either crude water extract or powdered bark of *Albizia anthelmintica* against *R. tegragona* infection in chicks in low, the data reported by Galal et al (1991) show that H. diminuta infection in rats responded to the administration of the crude water extract of *A. anthelmintica* bark with efficacy range between 68-100%.

This clearly emphasized the logic that the results obtained can not be extrapolated to predict the dose and effectiveness of drugs against other tapeworms in other species. It has been described that extensive

Table 1. Changes in serum constituents in chicks infected with 3 cysticercoids/chick following 40% Albizia water extract therapy

Group	Inorganic Phosphorus	Uric acid	Cholesterol	Total lipid	Total protein Gm/dl	AST i.u
	----------mg/dl ----------					
5 Infected controls	3.73 ± 0.3	5.78 ± 1.55	217.57 ± 16.01	514.54 ± 2.87	4.14 ± 0.09	67.18 ± 0
6 Systamex 15.86 mg/kg/day for 7 days	* 2.44 ± 0.25	**NS** 4.96 ± 0.59	**NS** 162.69 ± 4.64	** 436.18 ± 2.27	* 2.77 ± 0.36	**NS** 62.88± 0

NS = Not significant; = $P < 0.05$

Table 2. Activity of crude water extract of A. anthelmintica bark against R. tetragona infections in chicks

Group	No. of chicks Per group	No of cysticer-Coids per group	No of cysticer-Coids per group	Age of infection (days)	Concentration Of extract (%)	Days on Extract therapy	Total no of worms per group	Efficacy (%)
1 Infected controls	7	3	21	21	-	-	21	-
2 Albizia Extract	7	3	21	21	40	3	14	33.3

Table 3. Activity of A. anthelmintica bark crude water extract against R. tetragona infections in chicks

Group	No. of chicks Per group	No of cysticer-Coids per group	No of cysticer-Coids per group	Age of infection (days)	Concentration Of extract (%)	Days on Extract therapy	Total no of worms per group	Efficacy (%)
3 Infected controls	12	6	72	21	-	-	72	-
4 Extract at 20%	12	6	72	21	20	1	60	16.6
5 Infected Controls	12	3	36	21	-	-	36	-
6 Extract at 20%	12	3	36	21	20	1	24	33.3
7 Infected controls	12	2	24	21	-	-	24	-
8 Extract at 20%	12	2	24	21	20	1	12	50

Table 4. Changes in serum constituents in chicks infected with 3 cysticercoids/chick following 40% Albizia water extract therapy

Group	Inorganic Phosphorus	Uric acid	Cholesterol	Total lipid	Total protein Gm/dl	AST i.u
1 (Infected Controls)	3.73 ± 0.3	5.78 ± 1.55	217.57 ± 16.01	514.54 ± 2.87	4.14 ± 0.09	67.18 ± 0
2 Albizia extract 40%	* 2.78 ± 0.62	**NS** 9.4 ± 0.3	**NS** 136.41 ± 25.17	* 416.45 ± 30.85	* 5.74 ± 0.54	**NS** 79.49± 0

NS = Not significant; = $P < 0.05$

Table 5. Serum constituents in chicks infected with 6 cysticercoids/chick and chicks on 20% Albizia water extract for one day

Group	Inorganic Phosphorus	Uric acid	Cholesterol	Total lipid	Total protein Gm/dl	AST i.u
1 (Infected Controls)	2.14 ± 0.23	5.45 ± 1.62	145.12 ± 29.36	305.26 ± 21.39	4 ± 0.38	70.72 ± 10.2
2 Albizia extract 40%	* 2.64 ± 0.48	**NS** 7.94 ± 0.43	**NS** 158.12 ± 14.2	**NS** 326.9 ± 46.65	* 3.84 ± 0.55	**NS** 68.95± 0

NS = Not significant

Table 6. Haematological Parameters in chicks infected With 2 cysticercoids/chick and chicks on 20% dietary Albizia for 7days

Group	Hb (gm/dl)	RBC (X 10^6 mm)	PCV (%)	MCV (m^3)	MCHC (%)
5					
Infected Controls	7.84 ± 0.48	2.5 ± 0.1	30 ± 1.15	119.82 ± 0.49	26.07 ± 0.61
2	**NS**	**NS**	**NS**	**NS**	**NS**
Albizia food	8.54 ± 0.08	2.26 ± 0.12	32.5 ± 1.44	146.02 + 14.74	26.4 + 0.92

NS = Not significant

investigations on pathophysiological changes in several laboratory animal models are conducted in order to understand enteropathy, hepatopathy and nephropathy in human beings (shaw, 1976). There is almost complete lack of knowledge about the extent of R. tetragona infection in Bovans and Lohmann-type chicks and also about the response of infected chicks to *Albizia anthelmetica* therapy. In the present study, the release of AST into the serum of chicks to therapy strongly suggests the occurrence of intestinal lesion. It is necessary, however, to consider the possibility of damage to other organs such as the liver as a factor contributing to the change in the activity of AST in the serum of the experimental chicks since this enzyme is not intestine or liver specific.

In the present study, changes in serum constituents were, in general, within the normal ranges. The elevation in total protein concentration in the serum of chicks orally dosed with *Albizia anthelmintica* extract is not surprising. The absence of hypo-proteinaemia has been previously shown to occur in chicks fed 2% dietary Cassia Senna (Omer, 1990; Omer et al., 1992) and Lupinus termis (Mohamed, 1992; Omer et al., 1992) and decrease in serum total proten has been osbserved in chicks fed low levels of dietary R. communis or J. curcas (El Badwi, 1990; El Badwi et al., 1992 a, b) and Abrus precatorius (Omer, 1990). Cornelius and Kaneko (1963) suggested that the total serum protein levels represent the balance between the process of biosynthesis and catabolism or loss by haemorrhage or proteinuria. In the present study, decreased level of serum cholesterol was recorded in checks treated with *Albizia anthelmintica* aqueous extract. It is well documented that plasma cholesterol concentration is increased in a number of decrease state primarily liver disease, diabetes mellitus and hypothyroidism (Bush, 1970).

CONCLUSION

In conclusion, Bovans and lohmann-type chick are susceptible to infection with R. tetragona, a tapeworm, which causes varying degrees of enteropathy. The investigation of the efficacy of *Albizia anthelmintica* bark against *R. tetragona* infection in chicks is valuable although the isolation, characterization and concentration of the active ingredients in the plant bark should be accurately estimated. Further studies are needed to elucidate the mode of action of this plant extract as an anticestodal drug for effecte treatment of experimental *R. tetragona* infection in chicks.

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REFERENCES

Bush BM (1970). The effect of dietary iodine on blood cholesterol levels in the dog. Res., Vet, Sci., 11: 597-599.

Dafalla R, Adam SEI (1986). Effect of various levels of dietary selenium on Hybro-type chicks. Vet. Hum. Toxicol. 28: 105-100. histo-pathological changes. Vet, hum. Toxicol. 29: 222-225.

El badwi SMA (1990) Adam, S.E.I. and Hapke, H.J.(1992 a) Experimental Ricinus communis poisoning in chicks. Phytotherapy Research. 6: 205-207.

El Badwi SMA, Adam SEI, Hapke HJ (1992b). toxic effects of low levels of dietary Jatropha curcas seed on Brown Hisex chicks.Vet., Hum. Toicol., 34: 112-117.

Mohamed AB (1992). Effect of various levels of Dietary Lupinus termis and Cucurbita maxima on chicks, M. V. Sc. Thesis University of Khartoum, Sudan

Omer SA (1990). toxic Enterohepatonephropathy in Lohmann- type Broiler chicks due to Abus precatiorius and Cassia senna. M. V. Sc. Thesis, University of Khartoum. Sudan.

Salem HH, El Allat G (1969). Treatment of Taenia saqinata and Hymenolepis nana infection with praramomycin Trana. Roy. Soc. Trop. Med. Hyg, 63: 833-838.

Schenome H (1980). Praziquantel in the treatment of Hymenolepis nana infection in children, Am. J. Trop. Med. Hyg. 29: 320-325.

Soulsby EJL (1968). Helminths, Arthropods and Protozoa of Domesticated Animal, 6th ed. Bailliere, Tindall and Cassell. London, U.K.

Thomas H, Gonnert R (1977). The efficacy of Praziquantel against castodes in animal, Zschr, parasiten., 52: 117-120.