

COMPARATIVE EFFICACY OF KOROLLA (*MOMORDICA CHARANTIA*) EXTRACT AND IVERMEC® POUR ON WITH THEIR EFFECTS ON CERTAIN BLOOD PARAMETERS AND BODY WEIGHT GAIN IN INDIGENOUS CHICKEN INFECTED WITH *ASCARIDIA GALLI*

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ABSTRACT

Comparative anthelmintics efficacy of whole korolla fruit (*Momordica charantia*) extract and ivermectin® pour on was evaluated *in vitro* and *in vivo* on adult *Ascaridia galli* of indigenous chicken. The total trial chickens (60) were divided equally into 3 groups; group A as control, group B treated with ivermectin® pour on @ 500 µg/kg bwt by dropper through skin absorption for single dose and group C treated with 3% aqueous extract of korolla. Freshly prepared aqueous extract of the korolla fruit was performed as wormicidal properties against adult *A. galli* on *in vitro* and *in vivo* study. 3% aqueous extract of korolla fruit was treated as higher efficacy against *A. galli*. The live body weight was increased in chicken after treatment in group B and C respectively but in control group body weight was slowly decreased. TEC (million/cu mm), Hb (gm %) and PCV (%30 minutes) were increased significantly in chickens of treated groups whereas ESR was increased in control groups.

Key words: Anthelmintics efficacy, korolla, Ivermectin® pour on, *Ascaridia galli*, indigenous chicken, haematological parameters

INTRODUCTION

Among the animal production activities, poultry sector is the fastest growing what started as backyard village poultry industries during mid of the 20th century have evolved into skillfull and organized agri-business in most of the countries. Thus the production of poultry-products has greatly expanded in many of these countries in the recent past including Bangladesh. Poultry keeping is one of the most appropriate income generating activities for rural women specially for landless and marginal farmers (Paul *et al.*, 1990). The production of backyard poultry under semi- scavenging system is found suitable to the villagers as additional source of income and nutrient supplement (Latif, 2001). Nevertheless, it has been adversely affected by a variety of poultry diseases including *Ascaridia galli*, continue to play the vital role in hampering its development because the climatic condition of Bangladesh is highly favourable for parasitic growth, development and multiplication.

Among the parasites next to the coccidian, *A. galli* infection in chicken is considered to be of great importance and the rate of infection in Bangladesh varies from just over 30% to nearly 80% with a higher rate of infection in male than female and in young than adults (Islam, 1966; Sarker, 1977; and Mondal and Qadir, 1991). It is an intestinal worm and chickens under three months of age are mostly susceptible. Both in rural and farm conditions ascarids infection is rampant in Bangladesh (Islam and Shaikh, 1967; Sarker, 1977; Haq, 1986). *A. galli* causes extensive economic losses in different ways such as loss of weight gain, meat production, egg production and death of birds (Kamal, 1989).

Control of gastro-intestinal nematodes especially of *Ascaridia galli* is mainly based on regular anthelmintic treatment. Because of high economic cost and unavailability of anthelmintics, the farmers cannot afford to purchase. Furthermore, frequent use of these anthelmintics increased the resistant population of nematodes (Waller *et al.*, 1987). In this context, investigations on indigenous medicinal plants might contribute to develop effective but low cost herbal anthelmintics.

A number of anthelmintics available in the market, among which Ivermectin® pour on, Aviper® and Delentin® can be used against ascariasis. The published reports on their efficacy and tolerance on fowls is limited in Bangladesh. At present, there are no available effective drugs without toxicities but ivermectin is safe but expensive. To combat the above situation, alternative cheap available source of drug is herbal therapy.

Various parts of the korolla plant are popularly used as a remedy for various diseases including diabetes mellitus. The unripe fruit is used mainly as a treatment for late onset diabetes. Leaves and fruits are considered as tonic, somachic, carminative, anthelmintic, febrifuge and cooling. There are several other indigenous medicinal plants (Neem, Pineapple and Tobacco) having anthelmintics action (Mostofa, 1983 and Hossain, 1994) and used against both ecto and endo parasites in Bangladesh (Safique, 1983, Mannan *et al.* 1997). Therefore, if we use indigenous medicinal plant like korolla as anthelmintic instead of imported drugs the country will be benefited and can save her hardly earned foreign currency.

From these points of view, this research work has been designed to evaluate comparative efficacy of korolla fruit (*Momordica charantia*) extract and ivermec[®] pour on against *Ascaridia galli* and also evaluate their effects on certain blood parameters and body weight gain in indigenous chickens.

MATERIALS AND METHODS

The experiment was conducted at the Department of Pharmacology, Bangladesh Agricultural University, Mymensingh, during the period from February to May 2008. For *In vivo* Anthelmintic trial, a total of 60 indigenous chickens infected with *Ascaridia galli* were randomly selected from the local Market to study the comparative efficacy of korolla (*Momordica charantia*) extract and ivermec[®] pour on with their effects on certain blood parameters and body weight gain in indigenous chicken infected with *Ascaridia galli*. These chickens were between 45 to 60 days old and were selected on the basis of fecal examination. The body weights of assigned chickens were taken with digital weight machine and the results were recorded. During acclimatization the chicken were supplied with recommended feed and water. All the 60 fowls were randomly divided into 3 groups (A, B and C), each group containing 20 chickens and 4 sampling were performed on day 0 (just previously given treatment), 7, 14 and 21 to count number of parasites for assessing the efficacy of modern anthelmintic, Ivermec[®] (Ivermectin) pour on and korolla extract against ascariasis in chicken. Fowls of group 'A' were kept as control and not treated. Fowls of group 'B' were treated with ivermectin @ 500 µg/kg bwt by dropper through skin absorption for single dose. Fowls of group 'C' were treated with 3% aqueous extract of korolla.

For *in vitro* trial, adult *Ascaridia galli* were collected from the intestine of chickens slaughtered in local markets using a standard method (Rahman *et al.*, 1996) and placed in a petridish containing normal saline and was kept in incubator at 38°C until required for experiment. 8 adult parasites were placed on petridish with 3% aqueous extract of korolla fruit and another 8 adult parasites were placed on petridish with normal saline. During the study, the efficacy of korolla fruit extract was made in-terms of mortality of the treated parasite.

Mean live weight gain of each group of fowls on day 0, 7, 14 and 21 were recorded. Fowls under trial and control groups were weighed with Electric weighing machine. The weight of each fowl was taken before feeding in the morning and afternoon. The average of these two weights was calculated and recorded.

Haematological examinations were carried out in all the groups of chickens. About 0.5 ml of venous blood was collected from the wing vein at pre-feeding (0 day), day 7, 14 and 21 at 7 days interval and mixed with anticoagulant (Na-citrate 1%) at 1:5 ratio. The collected samples were brought to the laboratory and the haematological parameters (TEC, Hb content, PCV and ESR) were determined as per method described by Coffin (1955) and Jain (1986).

RESULTS AND DISCUSSION

Effect of Ivermec[®] pour on and 3% aqueous extract of korolla fruit on in vitro and in vivo trial

The range of mortality rate observed was between 37.5 to 75%. The lowest (37.5%) and highest (75%) mortality rate were observed in korolla fruit extract after 4 hours and 12 hours of treatment respectively on *in vitro* study. The mean numbers of dead parasites in the *in vitro* trial with 3% korolla fruit extract increased with time elapsed (3.0±1.00 at 4 h and 6.0±1.00 at 12 h). But no death of parasite was observed in control petridishes (Table 1).

Table 1. Number of parasites died on *in vitro* trial

Petridishes	No. of parasites used	No. of parasites dead		Percent (%)
		Up to 4 h	Up to 12 h	
Control	8x 3 = 24	0	0	37.5 to 75
Treated	8 x 3 = 24	3.0±1.00	6.0±1.00	

In case of *in vivo* study, the numbers of parasites were increased in chickens of control group and were decreased in treated groups. The total numbers were lower in ivermectin treated group than korolla fruit extract treated chickens (Table 2). It means that ivermectin was more effective than korolla fruit extract against *Ascaridia galli*. The differences were significant in both the treated groups on day 7, day 14 and day 21 compared to control groups.

Table 2. *In vivo* effect of Ivermec® pour on and korolla fruit leaf extract on number of parasites in chickens

Groups	Treatment	Number of parasites present in intestine			
		Day 0	Day 7	Day 14	Day 21
A	Control	9.0±1.58	10.0±2.35	12.0±1.87	4.0±1.58
B	Ivermec® pour on @ 500µg/kg bwt	7.0±1.58	5.0±1.87**	2.0±1.58*	1±1
C	Korolla fruit extract @ 30g/L drinking water	8.0±1.58	6.0±1.87** (25%)	4.0±2.35**	3.0±1.58** (62.5%)

** Means (p<0.01); *Means (p<0.05); Values above represent the mean±SE of 5 chickens.

Effect of Ivermec® pour on and korolla fruit extract on body weight

The administration of recommended doses of ivermec® pour on (500µg/kg bwt) and korolla fruit extract (30gm/litre drinking water) were given to chicken of group B and C respectively and group A was treated as a control group (Table 3). These anthelmintics significantly increased the percentage of body weight of chickens of groups B and C as 6.48% and 4.14% respectively on 21st day after treatment. But body weight of the chicken of control group A was not increased on 21st day of beginning of the trial rather the percentage of body weight was decreased gradually as 7.17% on 21st day of observation. These findings supported the findings of Sufian *et al.* (2006) who reported the 11.90% and 13.95% increase of body weight gain in ivermectin and korolla treated chickens respectively on 28th day after treatment against *A. galli* infection and they also observed decreased body weight gain (11.36%) in control groups. Some scientists also observed the significant increase of body weight gain in buffaloes treated with different anthelmintics namely Endokill, Vermic (injectable), Ralnex, Deminth and Levanid (Islam *et al.*, 1999, Arslan and Mahammed, 2001). The progress of body weight on 21st day in chicken of group B and C might be due to proper absorption and metabolism of feed nutrients. Because at that time the chickens of group B and C were gradually free from parasites. On the other hand, the body weight of chicken of group A was decreased gradually as they were still suffering from parasitic infestation. The parasites interfere with absorption of feed nutrients. The following workers also supported the results of Vassilev (1993), Bauck *et al.* (1989), Rehbein *et al.* (1993), Smith (1994), Ballwebner *et al.* (1997) and Imrul (1997).

Table 3. Effects of Ivermec® pour on and korolla fruit extract on body weight (gm) in chickens

Groups	Drug and dose	Pre-treatment Day 0	After drug administration (post-treatment)			Body weight gain/ loss (%)
			Day 7	Day 14	Day 21	
A	Control	223.00±4.06	215.00±3.54	212.20±3.44	207.20±2.52	-7.17
B	Ivermec® pour on @ 500µg/kg bwt	216.00±3.67	222.00±4.06	225.00±5.00	230.00±3.54**	+6.48
C	Korolla fruit extract @ 30g/L.drinking water	215.00±4.18	217.40±4.15	223.00±4.06	224.00±2.92**	+4.18

** Means (p<0.01); * Means (p<0.05); Values above represent the mean±SE of 5 chickens.

Effect of Ivermec[®] pour on and korolla fruit extract on haematological parameters

The total Erythrocyte count (TEC), Haemoglobin (Hb) content, Packed cell volume (PCV), Erythrocyte sedimentation rate (ESR) were examined in each chicken of all the experimental groups treated with Ivermec[®] pour on and korolla fruit extract at pre treatment and 7th, 14th and 21st days of post treatment. From this experiment it was obvious that TEC (million/cu mm), Hb (gm%) and PCV (%30 minutes) were increased significantly in chickens of treated groups whereas ESR was increased in control groups. These findings supported the findings of Sufian *et al.* (2006) and Islam *et al.* (2005). There was a positive correlation among RBC, Hb and PCV values. If TEC increased, the Hb and PCV also increased and vice versa. The highest number of erythrocyte was recorded on 21st day of drug dosing (Table 4). TEC was increased, because of partial/full destruction of parasites by the anthelmintics action. As a result absorption of nutrients was held properly. But in control group A, TEC was decreased due to effect of parasitism on haematopoietic system.

The effect of Ivermec[®] pour on (500µg/kg bwt) and korolla fruit extract (30gm/L drinking water) as anthelmintics in infected chicken showed a significant [(p<0.01) (p<0.05)] effect on PCV and Hb level. The PCV and Hb content were highest on 21st day after treatment in group B and C but slightly increased values were observed in group C. The both Hb and PCV values were gradually increased in treated chickens but gradually decreased in control groups (Table 4). This was might be due to gradual decrease of number of parasites in the treated groups than untreated groups.

ESR was decreased significantly in the chickens treated with ivermectin whereas it was increased gradually in case of korolla treated groups and in control group. The higher rate of increase between pre and post treatment ESR values was observed in the groups of chicken in control groups than korolla treated groups. These findings was totally different from the findings of Islam *et al.* (2005) and Sufian *et al.* (2006) who reported that ESR values decreases in both the treated groups. This disparity might be due to the methods of study or due to species variation.

Table 4. Effects of Ivermec[®] pour on and korolla fruit extract on haematological parameters in chickens

Groups	Drug and dose	Pre-treatment	After drug administration (post-treatment)		
		0 day	7 th day	14 th day	21 st day
TEC (million/cu mm)					
A	Control	263.80±43.55	272.60±33.64	270.40±33.09	267.00±32.85
B	Ivermec [®] pour on @ 500µg/kg bwt	312.00±19.34	318.00±19.85	303.00±22.89	329.00±20.21**
C	Korolla fruit extract @ 30g/L DW	308.00±19.47	313.40±19.89	299.40±20.44	302.00±21.83**
Hb (gm%)					
A	Control	8.04±0.33	7.62±0.33	7.48±0.30	7.34±0.32
B	Ivermec [®] pour on @ 500µg/kg bwt	8.28±0.30	8.44±0.32	8.56±0.37	8.72±0.36**
C	Korolla fruit extract @ 30g/L DW	8.14±0.30	8.30±0.36	8.34±0.36	8.34±0.27**
PCV (%30 minutes)					
A	Control	21.60±1.03	20.20±0.58	18.80±0.86	18.60±0.51
B	Ivermec [®] pour on @ 500µg/kg bwt	21.00±0.71	21.60±0.93	22.40±0.93	23.60±0.51**
C	Korolla fruit extract @ 30g/L DW	21.00±0.71	21.00±0.71	21.80±1.16	22.40±0.68*
ESR (mm/1st hour)					
A	Control	2.80±0.37	3.00±0.32	3.20±0.37	3.40±0.24
B	Ivermec [®] pour on 500µg/kg bwt	3.40±0.24	3.20±0.20	2.60±0.24	2.60±0.24**
C	Korolla fruit extract @ 30g/L DW	2.40±0.24	2.60±0.24	2.60±0.24	2.80±0.49*

** Means (p<0.01); * Means (p<0.05); Values above represent the mean±SE of 5 chickens; DW = Drinking water.

From this study, it is concluded that the 3% aqueous extract of korolla fruit (whole) having significant anthelmintic activity on adult *A. galli* by giving *in vitro* and *in vivo* trial. In this case, only the 3% concentration and adult parasites were used. So, study should be conducted to determine the anthelmintic effects of various concentration of this plant material against the various developmental stages (e.g. egg, embryonated egg) of *A. galli*. Further, *in vivo* trial should be given in large scale field condition to determine the toxic effects of this plant material, if any. By selecting accurate dose of aqueous extract of korolla fruit through *in vitro* and *in vivo* study, the farmers of Bangladesh can cheaply control the adult *Ascaridia galli* infection in indigenous chickens.

REFERENCES

1. Arslan SH and Mohammed BA (2001). The efficacy of albendazole and ivermectin in the control of parasitic helminths in sheep in Ninevah province. *Iraqi Journal of Veterinary Science* 14 (1): A9- A17.
2. Ballwebner L, Smith L Studemann, Yazwi Nski T and Skogerboe T (1997). The effectiveness of a single treatment with donomectin on ivermectin in the control of gastrointestinal nematodes in grazing yearling stocker cattle. *Veterinary Parasitology* 72 (1): 53-68.
3. Bauck SW, Jim GK, Guichon PT, Newcomb KM, Cox JL and Barrick RA (1989). Comparative cost-effectiveness ivermectin versus topical organophosphate in feed lot calves. *Canadian Veterinary Journal* 30 (2): 161-164.
4. Coffin DL (1955). *Manual of Veterinary Clinical Pathology*. 3rd edn., Comstock Publishing Associates Inc., Ithaca, New York.
5. Haq MS (1986). Studies on helminthes infection of poultry under rural condition of Bangladesh. *Bangladesh Veterinary Journal* 20 (3-4): 55-60.
6. Hossain A (1994). Comparative efficacy of modern anthelmintic against intestinal nematodiasis in cattle with that of neem seed (*Azadirachta indica*). M.Sc. (Vet. Science) Thesis, Department of Pharmacology, Bangladesh Agricultural University, Mymensingh.
7. Imrul M (1997). Efficacy of ivermectin (pour on formulation) against gastro-intestinal nematodiasis and ectoparasites in cattle. MS (Vet. science) Thesis, Department of Pharmacology, Bangladesh Agricultural University, Mymensingh.
8. Islam AWMS (1966). Systematic Survey of various helminths of economic importance parasiting the Gastrointestinal tract of domestic fowls in Mymensingh. M. Sc. (Vet. science) Thesis, Department of Parasitology, Bangladesh Agricultural University, Mymensingh.
9. Islam AWMS and Shaikh H (1967). A survey of helminths infection in the Gastro-intestinal tract of domestic fowls in Mymensingh district, Bangladesh. *Ceylon Veterinary Journal* 15 (3): 107-109.
10. Islam MI, Rafiq K and Mostofa M (1999). Efficacy of ivermectin against gastro-intestinal nematodiasis in cattle of Bangladesh. *Indian Journal of Pharmacology* 31 (3): 234-236.
11. Islam SA, Rahman MM, Hossain MA, Chowdhury MGA and Mostofa M (2005). Comparative efficacy of some modern anthelmintics and Pineapple leaves with their effects on certain blood parameters and body weight gain in calves infected with ascarid parasites. *Bangladesh Journal of Veterinary Medicine* 3 (1): 33-37.
12. Jain NC (1986). *Schalm's Veterinary Hematology*. 4th edn., Lea & Febiger, Philadelphia, USA.
13. Kamal AHM (1989). Pathological investigation on the mortality of chickens in Bangladesh Agricultural University Poultry Farm. M.Sc. (Vet. science) Thesis, Department of Pathology, Bangladesh Agricultural University, Mymensingh.
14. Latif MA (2001). Development strategies of Livestock and Poultry in Bangladesh. Proceedings of the semi and international poultry show 2001. World poultry Science Association, Bangladesh Branch.
15. Mannan MA, Rafiq K, Mostofa M and Hasan Q (1997). Comparative efficacy of ivomec[®] pour on, Neguvon[®] ointment and Neem-tobacco herbal preparation against naturally occurring humpsore lesions in cattle. *Bangladesh Veterinary Journal* 31 (3-4): 119-122.
16. Mondal MMH and Qadir ANMA (1991). Some epidemiological aspects of ascarids infection in chicken under the existing situation of Bangladesh Agricultural University Poultry Farm. *Bangladesh Agricultural University Research Progress* 5:332-336.
17. Mostofa M (1983). Efficacy of some indigenous medicinal plants against gastro-intestinal nematodiasis in cattle and their comparative activity with that of Nemafox. M. Sc (Vet. Science) Thesis, Department of Pharmacology, Bangladesh Agricultural University, Mymensingh.
18. Paul DC, Haque MF, Abedin MZ and Akter MS (1990). Participation of women poultry husbandry in rural Bangladesh. Paper presented in the 10th AFRSE symposium held at machining university, USA, during 14-17 October, 1990.
19. Rahman M H, Ahmed S and Mondal MMH (1996). *Introduction to Helminth Parasites of Birds and Animals in Bangladesh*. 1st edn., Mymensingh, Bangladesh.
20. Rehbein S, Haupt W, Schaschke R and Rosigkeit H (1993). Investigation on the efficacy of Ivomec[®] pour on against lung worm and gastrointestinal nematodes in enclosed fallow deer and influence of regular anthelmintic treatment on performance. *Zeitschrift fur Jagdwissenschaft* 34 (1): 1-14.

21. Safique MI (1983). Studies of anthelmintic effects of pineapple (*Ananus sativus*) leaves on sheep. M. Sc. (Vet. Science) Thesis, Department of Medicine, Bangladesh Agricultural University, Mymensingh.
22. Sarker AJ (1977). The Prevalence of Avian diseases in Bangladesh Agricultural University Poultry Farm. *Bangladesh Veterinary Journal* 10: 61-66.
23. Smith LL (1994). Evaluation of the impact of ivermectin sustained release bolus on weight gain and parasite control in dairy heifers during their first grazing season. Proceedings of the Annual Convention, American Association of Bovine Practitioners 26: 154-156.
24. Sufian AMA, Mostofa M, Choudhury ME, Awal MA and Sarker BC (2006). Comparative efficacy of Alendazole, Ivermectin and korolla (*Momordica charantica*) fruit extract against naturally infected ascariasis in indigenous chicken. *Progress Agriculture* 17 (1): 121-126.
25. Vassilev GD (1993). Activity of ivermectin and albendazole in the control of gastrointestinal nematode parasites and growth performance of two years old beef cattle. *Zimbabwe Veterinary Journal* 24 (4): 121-148.
26. Waller PJ, Asbakk K, Hrabok JT, Oksanen A and Nieminen M (1987). Prolonged persistence of fecally excreted ivermectin from reindeer in a sub-arctic environment. *Journal of Agriculture Food Chemistry* 54 (24): 9112-9118.