Effect Of Artemisia Herba Alba Extract On The Infection With *Heterakis gallinae* Compared With Albendazole In Turkey

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Abstract

Sixty (60), one-day old large white turkey poults (males) were divided into four equal groups and randomly allotted in their cages. Group 1 was neither infected nor treated, considered as a negative control. Groups 2, 3 and 4 were inoculated with 500 embryonated eggs of *Heterakis gallinae* (using stomach tube) at one-day old. Group 2 was not treated and regarded as a positive control (infected and none treated). On day 25 post infectation and for three successive days, group 3 was treated with Albendazole suspension 2.5 % (20 mg /kg B. wt.) and group 4 was treated with crude aqueous extract (CAE) of Artemisia herba alba (0.4 g /kg B.wt.) in drinking water. The turkey poults were fed balanced ration and weighed weekly for 6 weeks of age, and the weight-gain and FCR were calculated. The clinical signs and post mortem lesions were described. The heterakis eggs per gram of faeces (EPG) and adult worm burden of *H. gallinae* were counted immediately before treatment and on the 7th day after treatment. Some biochemical and histopathological changes were recorded.The results revealed that the eggs per gram of faeces (EPG) and worm burden in the caeca were nearly absent in the turkey poults of groups 3 and 4 when compared with the group 2 on the 7th day post-treatment. The weight, gain and FCR were improved in group 4 when compared with groups 2 and 3 at the end of experiment.The levels of ALT, AST enzymes, creatinine and uric acid levels were significantly increased in group 3 when compared with group 4. While the total protein and albumin levels were significantly decreased in group 3 when compared with group 4.The histopathological examination revealed that the liver of turkey poults which infected with *H. gallinae* and treated with Albendazole suspension (2.5 %) showing mild vacuolar degeneration in the hepatocytes. Meanwhile the liver of turkey poults which infected with *H. gallinae* and treated with Artemisia herba alba extract showing no degenerative changes in the hepatocytes which seem apparently healthy. These results clearly indicate that there was no adverse (toxic) effect of Artemisia herba alba on the liver cells, resulting in an improvement of the growth performance of turkey poults besides its good anthelmintic effect on the heterakis worms.The Artemisia herba alba aqueous extract is then considered as a good anthelmintic alternative therapy and recommended in the control of heterakis infectation in poultry industry, since it is effective and cheap.

Introduction

The nematode *Heterakis gallinae* is a common caecal pinworm (1-2 cm in length) of birds found in many gallinaceous species allover the world. Eggs are

sheded in the faeces and the infectation occurs when infective eggs ingested by definitive hosts. *H. gallinae* is not regarded as a serious threa chickens, but it is one of the most important nematodes of poultry due to its in the epidemiology of the flagellate *Histomonas meleagridis* which m infects the turkeys causing necrosis of the caecal mucosa, swelling o caecum, and liver necrosis (Papini and Cacciuttoli, 2008). On the other Homer and Butcher (1991); and Permin (2003) reported that *H. gal* infections linked to histomoniasis have been well documented in chickens.
The life cycle of *H. gallinae* is simple and direct similar to that of *Ascaridia* with a minimum prepatent period of 22 days under temperate climatic condi (Lund and Chute, 1972 and Movsessian and Pkhrikian, 1994). After ingesti the infective eggs and hatching of eggs in the upper small intestine, the la reached the caeca at the end of 24 hr PI. The larvae are embedded ir mucosal layer of the caeca for a varying period of 3-12 days (Lund and Cl 1972). The mature worms infect the lumen of blind caeca, fed on the ca contents. Fertilization occurred and oviposition starts 22-25 days post-infect at least (Movsessian and Pkhrikian, 1994). Diagnosis of *H. gallinae* is base faecal isolation of eggs or direct identification of adult worms in the inte (Soulsby, 1968).
H. gallinae caused severe caecal alterations characterized by necrosis, chr diffuse typhlitis, haemosidrosis, granulomas with necrotic center in submucosa of the caeca (Menezes *et al,* 2003 and Brener *et al,* 20 Pathological changes included congestion, haemorrhages and nodules necrotic center in the caecum, diffuse infiltration of lymphocytes, macropha and heterophilis, and desquamation of the caecal epithelium in addition to reduction of growth performance in chickens 2 weeks PI (Choudury and 1993). *H. gallinae* worm burden was slightly higher in backyard chickens boor body conditions (Jansson *et al,* 2004)

Albendazole in a single dose of 20 mg / kg B. wt. is safe and highly effectiv the treatment of chickens for *H. gallinae*. The efficacy in case of adult wo was 95 % and in larvae was 99 % with no adverse reactions (Tucker e 2007). On the other hand, Abd El-Rahman *et al.* (1999) stated that altho Albendazole is one of the most important antiparasitic drugs with high marg safety, some unwanted side effects which can not be ignored. The increas ALT and AST enzymes were obtained in rat given Albendazole in a dose of mg / kg B. wt. as a single dose.For controlling the problem of ascaridiosis, m anthelmintics were used. Inspite of their good results, most of them had effects as drug resistance and the risk of residues in tissues. So alterna therapies (herbal sources as Artemisia) have been suggested and selected the basis of the availability and efficiency as a trial in treatment of ascaridios animals (Idris *et al,* 1982 and Iqbal *et al,* 2004) and in chickens (Seddiek e 2007).

Artemisia herbs contain three major substances; santonin (anthelmin essential oil (anti-oxidant, hepatoprotetive and antibacterial) and two m volatile compounds "carvone and piperitone" (antifungal). Santonin substa was extracted to be used in treatment of different species of gastrointest nematodes (mixed infectation) in sheep (Iqbal *et al,* 2004), experime

haemonchosis in Nubian goats (Idris *et al,* 1982) and *Ascaridia galli* in chickens (Seddiek *et al,* 2007). The essential oil had antibacterial activity (Yashphe *et al,* 1979), and anti-oxidant "hepatoprotective" activity (Aniya *et al,* 2000; Juteau *et al,* 2002 and Kim *et al,* 2003). The volatile compounds had antifungal activity (Saleh et al, 2006).

Artemisia herba alba improved the growth performance (body weight, gain and FCR) in chickens either infected with *Ascaridia galli* (Seddiek *et al,* 2007) or fed ration contaminated with aflatoxin-B1 (Mobarak *et al,* 2008).The essential oil may protect the liver cells (hepatoprotective) as reported by Juteau *et al* (2002); Israpil *et al* (2002) and Kim *et al* (2003). Moreover, it enhanced the bilirubin clearance (Mobarak *et al,* 2008). Such oil is effective against some Gram-positive and Gram-negative bacteria (Yashphe *et al,* 1979) besides its antifungal activity associated with two major volatile compounds (carvone and piperitone) according to Saleh *et al* (2006).

Therefore, the present study was designed to investigate the effect of Artemisia herba alba extract on the turkey poults infected with invasive *H. gallinae* eggs through anthelmintic effect besides the growth performance (body weight, body gain and FCR), some biochemical and histopathological features.

Materials and Methods

Birds:

Sixty (60), one-day-old Large White Turkey poults (males) were purchased and kept in a confined parasite free environment. The birds were divided into four equal groups (each of 15 birds) and randomly allotted in their separate units in metal wire-floored batteries.

Feeding and watering:

Birds were given balanced commercial starter ration and water *ad-libitum* from 0 to 42 day of age (period of the experiment).

Preparation of *Heterakis gallinae* eggs:

The worms were collected from the caeca (blind portion) of the freshly killed turkey poults (naturally infected) and washed several times in saline. The heterakid eggs were obtained by gentle crushing gravid female worms with small spatula through a fine wire mesh into a small Petri dishes containing distilled water (2-3 mm. in depth) to which few drops of 2% formalin solution had been added, and then incubated for 21-28 days at 26-30C° to permit the eggs to embryonate (Oliver, 1953).

Dose of infectation:

Birds were inoculated intra crop (using stomach tube) with 500 embryonated eggs of *H. gallinae* at one day old according to Permin *et al* (1997).

Drugs:

1- Albendazole used in the present study was 2.5 % suspension produced by ARABCOMED comp. in a dose of 20 mg / kg B. wt.

2- The aqueous extract of Artemesia herba alba was prepared by using the soaking method of the shoots (leaves and stems). The shoots at a dose of 0.4 g / kg B. wt. were soaked in a known volume of distilled water for 24 hr (Marrif *et al,* 1995), then sieved (stock).

Experimental design:

Table (1) shows the experimental design during the age of 1- 42 days. Gr
was considered as a negative control (none infected and none treated),
groups 2, 3 and 4 were inoculated with 500 embryonated eggs of *H. gallin*
one day old. At the age of 25 days (25 days post-infectation), group 2 wa
treated and regarded as a positive control (infected and non treated), mean
group 3 was treated with Albendazole suspension 2.5 % in a dose of 20 m
B. wt. in the drinking water for three consecutive days and group 4 was tr
with crude aqueous extract (CAE) of Artemisia herba alba in a dose of 0.4
B. wt. in drinking water for the same period.

The clinical sings were recorded as well as the post-mortum lesions i
sacrificed birds. The poults were weighed every week and the weight-gai
FCR were calculated. The adult worms of *H. gallinae* were counted in five

$$\text{Calculation of EPG} = \frac{\text{Total no. of eggs counted}}{\text{No. of counting chambers}} \times 200$$

on the 25th day post-infectation (immediately before treatment) as well as c
7th day after treatment according to Permin and Hansen (1998). The det
pathological lesions were recorded in the five sacrificed birds. The egg cou
gram of faeces (EPG) from each group were counted immediately b
treatment (on the 25th day post-infectation) as well as on the 7th day
treatment to evaluate the degree of infectation using modified McM
technique (Thienpont *et al*, 1986) according to the following equation:-

Blood samples were collected from the wing vein of the five birds of each g
The samples were collected on the 7th day post treatment. Each sample
allowed to separate the serum and kept at -20 °C till biochemical analy
determine the serum Alanine aminotransferase (ALT), Asp
aminotransferase (AST) enzyme activity (Reitman and Frankel, 1957),
protein (Weichselbaum, 1946), albumin (Doumas, 1971), globulins (diffe
between total protein and albumin), serum uric acid (Haisman and Muller,
and creatinine (Husdan and Rapaport, 1968).

Specimens of the livers of all groups were taken immediately after slaugh
on the 7th day post treatment and fixed in 10% neutral buffered formalin. Pa
sections were stained with H&E and examined microscopically accordi
Bancroft *et al* (1996).

Table (1): Experimental design:

Experimental groups				
Groups	No. of turkey poults	Inoculation with 500 embryonated *H. gallinae* eggs at one day old	Grouping and treatment at the age of 25 day in drinking water for 3 consecutive days	
			Albendazole Suspension 2.5 % (20 mg / kg B. wt.)	Artemisia herba alba extract (0.4 gm / kg B.wt.)
(1)	15	Non	Non	Non
(2)	15	+	Non	Non
(3)	15	+	+	Non
(4)	15	+	Non	+

Experimental infection	
Time of infection	One day old
Infective dose per turkey poult	500 embryonated *H. gallinae* eggs
Route of infection	Directly inoculated intra-crop by the stomach tube

Sampling		
Parameters	No. of birds per group	Time of sampling
Clinical sings	All birds	Along experimental period
Post mortem lesions	5	On the 32nd day post infection PI
Egg per gram (EPG)	All birds	On the 25th and 32nd day (PI)
Worm burden	5	On the 25th and 32nd day PI
Growth performance	All birds	At one-day old and then weekly
Biochemical	5	On the 32nd day PI
Histopathology of liver	2	On the 32nd day PI

Statistical analysis:

The differences among experimental treatments were tested at P $\leq$0.05 by one-way ANOVA according to Duncan (1955) and Snedecor and Cochran (1969) using the computer software program called SPSS, Version 11, (2001).

Results

The observed clinical sings in the experimentally infected turkey poults were depression, dullness, loss of appetite, ruffled feathers, emaciation and unthriftness. The post-mortem examination of sacrificed poults showed emaciation of carcasses. Moreover, the caeca were inflamed indicating typhilitis, thickening and nodular formation in the cacal mucosa. The adult worms were firstly detected in the caeca on the 25th day post-infectation.

Table (2) shows the mean number of the eggs per gram of faeces (E groups 1, 2, 3 and 4 on the 25th and 32nd day post-infectation. The mean c in the infected and treated chickens (groups 3 and 4) was not signif altered just before the treatment (on the 25th day post-infectation). Moreo day 7 post treatment there were no significant differences in the mean nun EPG between groups 3 and 4, whereas the mean number of EPG in the groups was significantly decreased when compared with the positive (group 2).

Table (3) shows the mean number of the collected *H. gallinae* worms burden) on the 25th and 32nd day post-infectation. The mean number of burden in groups 2, 3 and 4 was not significantly changed on the 25th da infectation (just before treatment). Whereas, the mean number of worm b in groups 3 and 4 was significantly decreased when compared with grou the 32nd day post-infectation (on the 7th day post-treatment).

Table (4) shows the growth performance parameters in turkey poults ir with *H. gallinae* invasive eggs and treated with Albendazole suspens Artemisia herba alba aqueous extract. The mean body weight and gain in poults infected and treated with Artemisia herba alba aqueous extract (gr were significantly increased when compared with those treated with Alben suspension (group 3) at the age of 6 weeks, Also the feed conversio (FCR) was significantly improved when compared with those treate Albendazole suspension (group 3).

Table (5) shows some biochemical parameters in turkey poults infected v *gallinae* invasive eggs and treated with Albendazole suspension or Art herba alba aqueous extract. Total protein and albumin levels were signif decreased in group 3 when compared with group 4. While the levels of ALT, AST enzymes, creatinine and uric acid were significantly increa group 3 when compared with group 4.

Microscopically, tail of adult worm of *H. gallinae* infected the caeca of poult showing two unequal specules (fig.1). Cross section of the caec turkey poult infected with *H. gallinae* showed cross section of the adult w the caecal lumen (fig.2). Cross section of the liver of turkey poult infected v *gallinae* and treated with Albendazole suspension (2.5 %) showing mild va degeneration in the hepatocytes (Fig, 3). Cross section of the liver of poult infected with *H. gallinae* and treated with Artemisia herba alba showing no degenerative changes in the hepatocytes (apparently healthy 4).

Table (2): Eggs per gram faeces (EPG) in turkey poults infected with *H. gallinae* invasive eggs and treated with albendazole suspension or *Artemisia herba alba* aqueous extract. (Mean ± SE, n=12)

Age in days	Eggs per gram faeces ... no x 1000				LSD
	Grouping				
	Group (1)	Group (2)	Group (3)	Group (4)	
	-Ve control	+Ve control	Ablendazole	CAE	
25 days (just before treatment)	0.00 ^{b} ± 0.00	153.00 ^{a} ± 2.65	154.50 ^{a} ± 2.61	153.42 ^{a} ± 2.84	153.00 *
32 days (on the 7th day post-treatment)	0.00 ^{c} ± 0.00	157.67 ^{a} ± 2. 66	4.25 ^{b} ± 0.46	3.50 ^{bc} ± 1.68	4.25 *
Production %	0	100	2.70	2.22	-----
Reduction %	0	0	97.31	97.78	-----

Data were analyzed by One Way ANOVA.
LSD: Least significance difference among means at P ≤0.05.
Means with different alphabetical superscripts in the same row are significantly different.
CAE: Crude aqueous extract of Artemisia herba alba.

Table (3): Worm burden in turkey poults infected with *H. gallinae* invasive eggs and treated with albendazole suspension or *Artemisia herba alba* aqueous extract. (Mean ± SE, n=5)

Age in days	Grouping				LSD
	Group (1)	Group (2)	Group (3)	Group (4)	
	-Ve control	+Ve control	Ablendazole	CAE	
25 days (just before treatment)	0.00 ^{b} ± 0.00	67.20 ^{a} ± 1.86	66.40 ^{a} ± 0.81	66.20 ^{a} ± 2.13	66.20 *
32 days (on the 7th day post-treatment)	0.00 ^{c} ± 0.00	61.00 ^{a} ± 0.71	3.00 ^{b} ± 0.32	2.40 ^{b} ± 0.25	2. 40 *
Production %	0	100	4.92	3.93	-----
Reduction %	0	0	95.08	96.07	-----

Data were analyzed by One Way ANOVA.
LSD: Least significance difference among means at P ≤0.05.
Means with different alphabetical superscripts in the same row are significantly different.
CAE: Crude aqueous extract of Artemisia herba alba.

Table (4): Growth performance parameters in turkey poults infected with *H. gallinae* invasive eggs and treated with albendazole suspension or *Artemisia herba alba* aqueous extract. (Mean ± SE, n=15)

Time (Days)	Growth performance parameters	Groups				LSD
		Group (1) -Ve control	Group (2) +Ve control	Group (3) Ablendazole	Group (4) CAE	
1 day old	Body weight (gm)	65.67 ^{a} ± 0.95	66.87 ^{a} ± 0.96	450.20 ^{a} ± 2.90	65.93 ^{a} ± 0.90	NS
7 day old	Body weight (gm)	239.33 ^{a} ± 0.86	231.47 ^{b} ± 1.03	233.83 ^{b} ± 1.39	233.13 ^{b} ± 1.38	5.40
	Body gain (gm)	171.53 ^{a} ± 1.91	162.60 ^{b} ± 1.57	164.87 ^{b} ± 0.85	166.13 ^{b} ± 1.39	5.40
	FCR	1.31 ^{a} ± 0.01	1.33 ^{a} ± 0.01	1.32 ^{a} ± 0.02	1.32 ^{a} ± 0.01	NS
14 day old	Body weight (gm)	449.40 ^{a} ± 1.81	356.88 ^{b} ± 1.46	358.33 ^{b} ± 2.17	353.60 ^{b} ± 2.01	91.1
	Body gain (gm)	215.60 ^{a} ± 2.36	137.47 ^{b} ± 2.03	133.33 ^{b} ± 1.89	132.93 ^{b} ± 1.40	78.1
	FCR	1.35 ^{b} ± 0.01	1.58 ^{a} ± 0.02	1.58 ^{a} ± 0.01	1.57 ^{a} ± 0.01	0.23
21 day old	Body weight (gm)	770.20 ^{a} ± 1.83	556.87 ^{b} ± 4.19	549.33 ^{b} ± 3.18	549.00 ^{b} ± 3.14	213.
	Body gain (gm)	320.80 ^{a} ± 3.03	191.20 ^{b} ± 3.35	192.27 ^{b} ± 2.68	193.93 ^{b} ± 2.78	127.
	FCR	1.54 ^{b} ± 0.02	2.41 ^{a} ± 0.03	2.39 ^{a} ± 0.03	2.41 ^{a} ± 0.02	0.86
28 day old	Body weight (gm)	1261.67 ^{a} ± 5.18	757.47 ^{c} ± 2.82	947.33 ^{b} ± 8.09	951.27 ^{b} ± 8.45	189.
	Body gain (gm)	491.53 ^{a} ± 4.67	200.47 ^{c} ± 5.49	398.73 ^{b} ± 7.69	401.13 ^{b} ± 8.04	90.4
	FCR	1.55 ^{c} ± 0.01	2.43 ^{a} ± 0.02	1.87 ^{b} ± 0.02	1.87 ^{b} ± 0.02	0.32
35 day old	Body weight (gm)	1814.13 ^{a} ± 6.87	1049.47 ^{c} ± 10.94	1406.00 ^{b} ± 6.85	1415.33 ^{b} ± 8.27	356.
	Body gain (gm)	545.87 ^{a} ± 5.99	290.60 ^{c} ± 12.34	458.67 ^{b} ± 8.02	465.40 ^{b} ± 8.67	80.4
	FCR	1.57 ^{d} ± 0.02	2.58 ^{a} ± 0.03	1.92 ^{b} ± 0.02	1.81 ^{c} ± 0.03	0.11
42 day old	Body weight (gm)	2754.67 ^{a} ± 6.24	1392.00 ^{d} ± 15.19	2235.33 ^{c} ± 7.41	2292.34 ^{b} ± 7.79	36.0
	Body gain (gm)	947.20 ^{a} ± 4.80	323.27 ^{d} ± 18.48	829.00 ^{c} ± 9.24	867.33 ^{b} ± 8.85	38.3
	FCR	1.61 ^{d} ± 0.01	2.41 ^{a} ± 0.04	1.88 ^{b} ± 0.01	1.70 ^{c} ± 0.02	0.10

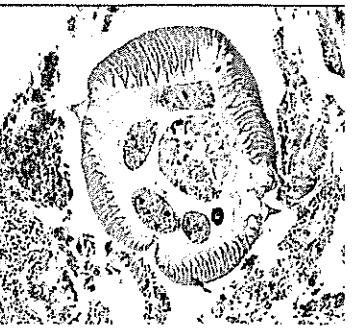
Data were analysed by one-way ANOVA. CAE: Crude aqueous extract of Artemisia herba alba.
LSD: Least significance difference among means at P ≤0.05 NS = Non significant.
Means with different alphabetical superscripts in the same row are significantly different.

Table (5): Some biochemical parameters in turkey poults infected with *H. gallinae* invasive eggs and treated with albendazole suspension or *Artemisia herba alba* aqueous extract. (Mean ± SE, n=5)

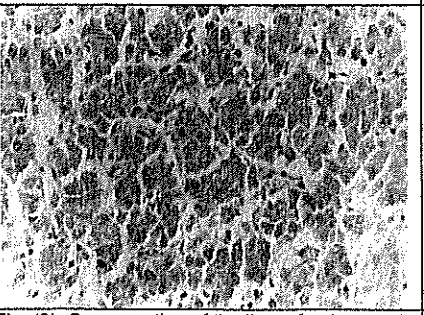
Parameters	Grouping				LSD
	Group (1) -Ve control	Group (2) +Ve control	Group (3) Ablendazole	Group (4) CAE	
ALT (IU/L)	18.80^{b} ± 0.31	18.15^{b} ± 0.27	21.10^{a} ± 0.29	19.04^{b} ± 0.30	5.94*
AST (IU/L)	217.58^{b} ± 0.96	218.25^{b} ± 2.16	262.40^{a} ± 2.33	221.70^{b} ± 2.42	42.26*
Total Protein (gm/dl)	4.34^{a} ± 0.20	4.35^{a} ± 0.21	3.40^{b} ± 0.17	4.86^{a} ± 0.13	0.78*
Serum albumin (gm/dl)	1.62^{a} ± 0.06	1.75^{a} ± 0.06	0.59^{b} ± 0.06	1.16^{a} ± 0.14	0.50*
Serum globulin (gm/dl)	2.72^{b} ± 0.07	2.60^{b} ± 0.05	2.81^{b} ± 0.08	3.70^{a} ± 0.07	0.89*
Creatinine (IU/L)	0.08^{b} ± 0.01	0.07^{b} ± 0.005	0.11^{a} 0.009	0.07^{b} ± 0.004	0.02*
Uric acid (mg/dl)	3.40^{b} ± 0.21	3.59^{b} ± 0.22	5.40^{a} ± 0.35	3.70^{b} ± 0.18	1.60*

Data were analysed by one-way ANOVA. CAE: Crude aqueous extract of Artemisia herba alba.
LSD: Least significance difference among means at P ≤0.05.
Means with different alphabetical superscripts in the same row are significantly different.

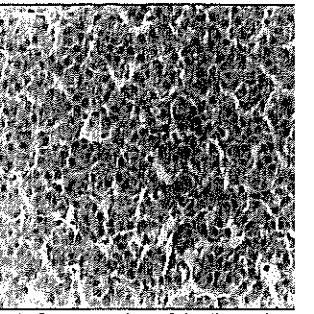
Fig, (1): Posterior end of *H. gallinae* adult worm (male), ventral view, infected the caecum of turkey poult showing two unequal specules.



Fig, (2): Cross section of the caecum of tu poult infected with *H. gallinae* showing the nematodal worm in the caecal lumen. H& 200).



Fig, (3): Cross section of the liver of turkey poult infected with *H. gallinae* and treated with albendazole suspension (2.5 %) showing mild vacuolar degeneration in the hepatocytes. H&E., (X 400).



Fig, (4): Cross section of the liver of tur infected with *H. gallinae* and tre *Artemisia herba alba* extract sh degenerative changes in the hep (apparently healthy). H&E.

Discussion

Infections with intestinal worms including *Heterakis gallinae* might cause los of 10- 12% due to impaired feed conversion, reduced growth and production, and increasing mortality (Schou and Permin, 2003). *H. galli* caused severe caecal alterations in the turkey poults characterized by necro chronic typhlitis, haemosidrosis and nodular formation in the caeca (Meneze *al*, 2003 and Brener *et al*, 2006).In the present study, the infectation of tu poults with *H. gallinae* appeared to cause depression, dullness, emacial dehydration and lower locomotion. Similar results were obtained by Brener (2006). Pathological changes included congestion, haemorrhages and nod

with necrotic center in the caecum were noted in this study. Similar results were obtained by Choudury and Das (1993).

In the present study, the reduction rate in eggs per gram of faeces (EPG) was 97.78 % in the turkey poults infected with 500 embryonated *H. gallinae* eggs and treated with Artemisia herba alba crude aqueous extract (group 4) on the 7th day post-treatment which was nearly the same as that of group 3 (Albendazole suspension-treated group). Similar results were obtained in the chickens by Seddiek *et al*, 2007 (100 % reduction) and Tucker *et al* (2007) (95 % reduction). On the other hand, the present results were nearly similar to that of Akhtar *et al* (1982) who treated Ascaris species *(Neoascaris vitulorum)* in the young buffalo calves with the Artemisia leaves (100% reduction), whereas it was higher than that of Iqbal *et al* (2004) who used Artemisia brevifolia crude aqueous extract (CAE) as anthelimintic for treatment of the natural infectation with different species of nematodes in the sheep (67.2% reduction). These results revealed that the Artemisia aqueous extract was highly effective anthelmintic leaves against *H. gallinae* worm infectation as other nematodes.

The worm burden in both groups of turkey poults infected with *H. gallinae* eggs and treated with Albendazole suspension and Artemisia crude aqueous extract (groups 3 and 4) was nearly absent when compared with that in the positive control group (group 2) on the 7th day post-treatment. This may be due to the direct anthelmintic effect of santonin substance present in the Artemisia herb on *H. gallinae* adult worms. Similar results were obtained by Rachkovskaia (1978) and Jansson *et al* (2004) who found that the santonin substance prepared from the Artemisia plant caused changes in the musculocutanous sac (cuticle, hypoderm and muscle cells) of the worm through its direct action on muscle cells of the worm resulting in complete relaxation of its muscular layer leading to its expulsion to outside (vermifuge).

Regarding to the body weight, weight-gain and FCR. Table (4) shows an increase in both of body weight and body weight-gain and an improvement in the FCR in turkey poults of group 4 (treated with Artemisia herba alba aqueous extract) when compared with those of group 3 (treated with Albendazole suspension). Similar results were recorded by Yashphe *et al* (1979) in rat; Iqbal *et al* (2004) in sheep; Seddiek *et al* (2007) and Mobarak *et al* (2008) in chickens. This may be either due to the direct anthelmintic effect of Artemisia crude aqueous extract on the *H. gallinae* worms (Rachkovskaia, 1978) or to the indirect effects as antimicrobial, antifungal and antioxidant activities (Idris *et al*, 1982; Israpil *et al*, 2002 and Kim *et al*, 2003).

In the present results, ALT and AST enzymes were significantly increased in group 3 when compared with group 4 while the total protein and albumin levels were significantly decreased in turkey poults of group 3 when compared with that of group 4. This may be due to side (toxic) effect of Albendazole on the liver cells. Similar results were obtained by Choi *et al* (2008) in human and Abd El-Rahman *et al* (1999) in rat. This indicates that the Artemisia hrba alba aqueous extract has no side effect on the liver cells.

Creatinine and uric acid levels were increased in group 3 when compared with group 4. This indicates that there is no adverse effect of Artemisia herba

alba aqueous extract on the kidneys.Microscopically, the caecum in t poults infected with *H. gallinae* showed nematodal worm in the caecal l with inflammatory reaction in the caecal submucosa. Similar results detected by Brener *et al* (2006). The liver of turkey poults infected wi *gallinae* and treated with Albendazole suspension (2.5 %) showed vac degeneration in the hepatocytes indicating the toxic effect of Albendazole c liver cells, meanwhile the liver of turkey poults infected with *H. gallinae* treated with Artemisia herba alba extract showed no degenerative chang the hepatocytes which seem apparently healthy. The histopathological re ensured that the Artemisia herbal extract has no adverse effect or hepatocytes he adverse effect of Albendazole in group 3 on the liver func and tissue may be due to the use of Albendazole for somewhaqt long time than that recommended by the producer. These changes were similar to obtained by Abd El-Rahman *et al* (1999) who used a dose of 400 mg / kg l in rat.For this reason, a further study must be carried out on Albendazole i recommended dose and time and the Artemisia herba alba for treatment *gallinae* in the future.t could be concluded that the aqueous extract of Arte herba alba has anthelmintic effect resulting in an improvement of the gr performance of turkey poults.

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ى العربى

ستخلص نبات الشيح على العدوى بالهتراكس جالليني مقارنة بالألبندازول فى الرومى

صديق عبد الرحمن[1] د/على محمد محمد أحمد[2] د/هانـــم فتحى خـــاطر[3] د/ محـــمد
يجى
حوث صحة الحيوان (فرع بنها- قسم أمراض الدواجن) معهد بحوث صحة الحيوان (فرع بنها- قسم
الحيوى والسموم وأمراض النقص الغذائى)[2]
بنها- كلية الطب البيطرى بمشتهر - قسم الطفيليات[3] جامعة بنها- كلية الطب البيطرى بمشتهر - قسم أمراض

ون (٦٠) كتكوتا من ذكور الرومى عمر يوم (سلالة الرومى الأبيض) قسمت إلى أربعة مجموعات
ة ووضعت فى أقفاصها. المجموعة الأولى لم تعدى ولم تعالج (مجموعة ضابطة سلبية). كتاكيت
عات الثانية والثالثة والرابعة تم عدواها بعدد ٥٠٠ بويضة من الهتراكس جالليني (الطور المعدى) لكل
باستخدام أنبوب اللى المعدى عند عمر يوم، المجموعة الثانية لم تعالج وإعتبرت كمجموعة ضابطة إيجابية
وغير معالجة). فى اليوم الخامس والعشرين من العدوى تم العلاج ولمدة ثلاثة أيام متتالية، المجموعة الثالثة
جها بمعلق الألبندازول بتركيز ٢,٥ % وبجرعة ٢٠ مجم/ كجم من وزن الجسم، المجموعة الرابعة تم
يمستخلص مانى لنبات الشيح (الأرطميزيا هيربا ألبا) وبجرعة ٤, ٠جم/ كجم من وزن الجسم وذلك فى
شرب، تم تغذية كتاكيت الرومى على عليقة متزنة. وتم وزنهم والعلف المستهلك أسبوعيا ولمدة ستة أسابيع
وتم حساب وزن الجسم المكتسب ومعدل التحويل الغذائى. تم وصف الأعراض، والصفة التشريحية على
المذبوحة. تم عد بويضات ديدان الهتراكس جالليني فى كل جرام من الزرق وكذلك عد الديدان اليافعة
س داخل الأعورين قبل العلاج مباشرة وكذلك بعد بداية العلاج بسبعة أيام. وتم تسجيل بعض التغيرات
سيائية والهستوباثولوجية.أوضحت النتائج أن عدد بويضات الهتراكس جالليني فى الزرق وكذلك عدد الديدان
فى الأعورين يكاد يتلاشى فى كتاكيت الرومى بالمجموعتين الثالثة والرابعة إذا ما تم مقارنتهما بالمجموعة
(الضابطة الإيجابية) فى اليوم السابع من بداية العلاج. وزن الجسم وزن الجسم المكتسب ومعدل التحويل
أظهر تحسن ملحوظ فى المجموعة الرابعة إذا ما تم مقارنتهم بالمجموعتين الثانية والثالثة وذلك فى نهاية
. م ملاحظة زيادة معنوية فى مستوى إنزيمات الكبد (ALT,AST) وكذلك مستويات الكرياتينين وحمض
ك فى مصل الدم بالمجموعة الثالثة إذا ما تم مقارنة هذه المستويات بالمجموعة الرابعة، بينما أظهرت
ت البروتين الكلى والألبيومين فى مصل الدم بالمجموعة الثالثة نقصا معنويا إذا ما قورنت بالمجموعة
.أوضحت الفحوص الهستوباثولوجية أن الكبد فى كتاكيت الرومى المعدية بديان الهتراكس جالليني ومعالجة
الألبندازول بتركيز ٢,٥ % أظهر mild vaccular degeneration فى خلاياه. بينما لم يظهر الكبد
كيت الرومى المعدية بنفس الديدان ومعالجة بالمستخلص المانى لنبات الشيح أية تغيرات (no
degenerative cha) فى خلاياه وبدا كما لو كان طبيعيا (apparently healthy).وهذه النتائج تؤكد
ح أنه لايوجد تأثير ضار للمستخلص المانى لنبات الشيح على خلايا الكبد مما أدى إلى التحسن الملحوظ فى
و الرومى وذلك إلى جانب تأثيره الجيد كطارد لديدان الهتراكس.وخلاصة هذه الدراسة: أن المستخلص
لنبات الشيح يعتبرعلاج بديل جيد كطارد للديدان لذا ينصح باستخدامه فى محاولة السيطرة على عدوى
س فى الدواجن حيث أنه فعال ورخيص.