

Effects Of Aqueous Extract Of the Plant *Datura metel* Against *Ascaridia galli* Infection In Birds

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Abstract

Objective: The present study was planned to identify the efficacy of *Datura metel* aqueous seeds extract against *Ascaridia galli* infection on body weight and some haematological parameters among *in vivo* in Birds.

Methodology: The present study was carried out in advanced zoology laboratory/science college-Kufa university from February,2015 to January,2016. This study was carried out on 70 bird from layer hens

type Domestic Pigeons naturally infected with *A. galli* , after determination LD50 on *Ascaridia galli* and certain that *Datura metel* without toxicity where used three groups were concentrations this material by two way the one orally 100 and 300 mg/kg respectively from body weight with *Datura metel* aqueous seeds extract and leave about other groups as positive control for 21 days.

Result: The results showed that *Datura metel* aqueous seeds extract with concentration (300mg / kg) gave significantly ($p<0.05$) improving in body weight gain , increasing Hemoglobin values (Hb), Packed cell volume (PCV) and determination of Total erythrocyte count (TEC) to weeks (7,14 and 21) days following the concentration (100 mg / kg) which gave same result but lesser than above concentration compared with positive groups control (non-treated).

Conclusion: The study proved that gave *Datura metel* aqueous seeds extract with concentration (300mg / kg) improved studied standers for naturally infested birds with *Ascaridia galli* after twice orally administration per day for continuous three weeks .

Recommendations: Heading to use of medicinal plants for abundance, cheap price, more effective and side effects less.

Keyword: *Datura metel*, *Ascaridia galli*, Body weight, domestic pigeons.

تأثير المستخلص المائي لنبات الداتورة المضادة للإصابة بطفيلي
Ascaridia galli في الطيور

لخلاصة

الهدف: تهدف الدراسة لمعرفة تأثير المستخلص المائي لبذور نبات الداتورة ضد الإصابة بطفيلي *Ascaridia galli* في الطيور على وزن الجسم وبعض المعايير الدموية داخل جسم المضيف *In vivo*
المنهجية: أجريت هذه الدراسة في مختبر الحيوان المتقدم/ كلية العلوم- جامعة الكوفة للمدة من شهر شباط 2015 لغاية شهر كانون الثاني 2016. تمت الدراسة الحالية على 70 طير من نوع domestic pigeons مصاب

طبيعياً بطفيلي *Ascaridia galli* , بعد ان تم التأكد من عدم سمية المستخلص بتحديد LD50 حيث استخدمت ثلاثة مجاميع تم معاملة مجموعتين منها بالتراكيز 100 و 300 ملغم/كغم على التوالي من وزن الجسم بتجريبها عن طريق الفم من المستخلص المائي لبذور الداتورة *Datura metel* وتركبت المجموعة الثالثة كسيطرة موجبة لمدة 21 يوم.

النتائج: بينت النتائج أن المستخلص المائي لبذور الداتورة بتركيز (300 ملغم/كغم) أعطى أفضل نتائج و بصورة معنوية ($P < 0.05$) في مقاومة الدودة وتحسين الزيادة بوزن الجسم , زيادة نسبة الهيموغلوبين , الخلايا الدمية المرصوصة والعد الكلي لكريات الدم الحمراء للأسابيع (7, 14 و 21) يوم وبعدها التركيز (100 ملغم/كغم) الذي أعطى نفس النتائج لكن اقل بصورة معنوية عن التركيز السابق مقارنة مع مجموعة السيطرة الموجبة (غير المعاملة).

الاستنتاج: أثبتت الدراسة أن إعطاء المستخلص المائي لبذور الداتورة بالتركيز (300 ملغم/كغم) قد حسن المعايير المدروسة للطيور المصابة طبيعياً بديدان الاسكاريديا جالي بعد الاعطاء مرتين في اليوم ولمدة ثلاثة أسابيع.

التوصيات: التوجه الى استخدام النباتات الطبية لوفرتها , رخص ثمنها , اكثر فعالية وتأثيرات جانبية اقل.

Introduction

Ascaridia galli (Nematoda) is a roundworm parasitizing the small intestine of birds and is by far the most prevalent of all helminths infecting poultry (Lalchaudawa, 2008).

A. galli infections is common worm found especially in wide carry birds causing heavy economic wastage in neoteric poultry, continue to be the most debilitating factor impeding poultry output resulting in distortion growth, weight lack, diarrhoea, poor absorption of nutrients, efecient in vitamin A and protein, death and even the spread of fatal bacterial infections (Gauly *et al.*, 2007).

World Health Organization (WHO) has recognized the necessity for investigation and mobilization of ancient used medicinal plants for anthelmintic activity against different helminth parasites (WHO, 2013).

The modern studies focus on using natural substances founding in fruits to treat the ascaridiosis and compare their anthelmintic efficacy with anthelmintic drugs, like *Thespesia lampas* using the roots to treated inroad of *Ascaridia galli* and *Railletina spiralis* (Satish *et al.*, 2009). Also using Neem leaves and Pineapple powder then comparison their anthelmintic efficacy with *Ascaridia galli* (Gautam *et al.*, 2010)

also benefit from citrus peels extract (Anas *et al.*, 2012) on *Ascaridia galli*.

Datura metel belongs to the *Solanaceae* family, also known as the nightshade family. This plant is widely distributed all over the world (Saadabi *et al.*, 2006). Clinical deviations include: Parkinson's disease, psychological and sleeping disorders, rheumatism and intestinal parasitic infestation in rodents can also be treated with seed extracts of *D. metel* (Chollet *et al.*, 2010). The present study was undertaken to evaluate the effect of *Datura* aqueous seed extract against ascariasis in birds. the aim of this research to identify the efficacy of *Datura metel* aquous seeds extract against *Ascaridia galli* infection in birds.

Materials And Methods

Preparation of plant

Datura metel seeds brought from local markets of AL-Najaf governorate, purified from impurities and kept in laboratory temperature in dry place and grind by blender to get on fine powder. They classified and identified by college of Science / Department of Biology, University of Kufa.

Preparation of aqueous extract of

Datura metel seeds & stock solutions

Extract of *Datura metel* seeds is prepared according to (5) by mixing 60g of dried powder of *Datura metel*

seeds with distilled water 200 ml by using hot plate magnetic stirrer at 40°C temperature for 24 hours then filtered to give away of the rest and laid in incubator at 40°C to obtain dried extract and kept in -20°C till use.

The stock solution of the aqueous extract was prepared by dissolving the amount of crude extract of (1000, 2000, 3000, 4000) mg in distilled water by completing the volume to 20 ml for preparation the following corresponding concentrations of (100,300) mg/ml used for oral dosing depending on body weight.

Median Lethal Dose (LD50):

Birds divided into 5 groups each group contain 6 birds of experimental animals to determined the value LD50 of aqueous plant seed extract by oral administration and observed during 24 hours and recorded all information related to virtual behavior and mortality, according to law following: - (Behrens and Karber,1953).

$LD50 = \frac{\text{Highest dosage} \times \sum ab}{n}$

LD50: Median Lethal Dose.

Highest dosage: Highest dose killed all animals.

$\sum ab$: Resulting.

n : Number of animals in one group.

Procurement and acclimatization of birds

A total of 70 domestic pigeons comprising of both sex, of 25 weeks old were randomly selected used for the experiment. The birds were housed in the Animal Laboratory of the Department of Biological Sciences, Science University, The birds were acclimatized for a period of three weeks prior to the commencement of the experiment.

Determination of body weight and Hematological parameters

The birds were weighed and blood samples taken from them, before and

after treated, The birds were weighed using a Sartorius electric weighing balance sensitive to $\pm 0.01g$. Blood samples were collected from neck vein of birds of both control and treated groups at pre-feeding and during feeding (21 days) period at 7 days interval. Hemoglobin estimation (Hb), Packed cell volume (PCV) and determination of Total erythrocyte count (TEC) were performed following the method described by (Dacis and Lewis,2006).

Effect of aqueous extract of *Datura metel* seeds *In vivo*:-

All the 40 infected birds randomly divided into 3 groups each group contain 10 birds The dose rate for individual bird was calculated on body weight as per manufacturer recommendation , oral administrated by using syringe and directly to crop .

The birds in group 1 (infected birds) which not treated serving as positive controls, The birds in group 2 (treated birds) with *Datura metel* aqueous seeds extract that was administered orally (100 mg / kg) body weight by dropper for 7 consecutive days twice orally administration per day, The birds in group 3 (treated birds) with *Datura metel* aqueous seeds extract that was administered orally (300 mg / kg) body weight by dropper for 7 consecutive days twice orally administration per day.

All the birds of treated and control groups were closely for 21 days after treatment.

Statistical analysis

Comparison of the mean values of the treatment against those of the control group was calculate repeaters by using t-test Biostatic 2007 and the level of probability considered significant when $P < 0.05$.

Results

Table (1) Median lethal dose of different doses of aqueous extract of *Datura metel* seeds (orally) in birds

Dose mg/kg	Number of birds	Difference between dose a	No. of dead	Rate of dead b (second+previous/2)	Product ab
1000	6	500	0	0	0
1500	6	500	0	0	0
2000	6	500	2	1	500
2500	6	500	3	2.5	1250
3000	6	500	6	4.5	2250

Product =4000

LD50 =3000-4000/6=2333.33mg/kg.

Table(2):Effects of *Datura metel* aqueous seeds extract on body weight (gm%) in birds.

Group of birds	Concentration (mg/kg)	Pre-treatment (mean \pm SD)	Post-treatment/ days (mean \pm SD)			P-Value (p<0.05)
			7 th day	14 th day	21 st day	
1	+veControl	*20.24 \pm 0.18	*19.20 \pm 0.15	*15.18 \pm 0.06	*10.22 \pm 0.03	
2	Datura seed extract (100mg/kg)	*20.35 \pm 0.34	*23.46 \pm 0.46	*23.52 \pm 0.55	*24.23 \pm 0.59	
3	Datura seed extract (300mg/kg)	*23.43 \pm 0.37	*24.47 \pm 0.42	*25.22 \pm 0.56	*25.36 \pm 0.65	

* Significant difference (P<0.05) between treated and control group .

Table(3):Effects of *Datura metel* aqueous seeds extract on Hb estimation (g/dL %) in birds.

Group of birds	Concentration (mg/kg)	Pre-treatment (mean \pm SD)	Post-treatment/ days (mean \pm SD)			P-Value (p<0.05)
			7 th day	14 th day	21 st day	
1	+veControl	*20.75 \pm 0.18	*20.60 \pm 0.07	*18.0 \pm 0.05	*16.0 \pm 0.03	
2	Datura seed extract (100mg/kg)	*30.85 \pm 0.02	*32.78 \pm 0.05	*32.23 \pm 0.07	*32.48 \pm 0.09	
3	Datura seed extract (300mg/kg)	*30.90 \pm 0.06	*32.92 \pm 0.13	*34.88 \pm 0.23	*40.96 \pm 0.55	

* Significant difference (P<0.05) between treated and control group .

Table(4):Effects of *Datura metel* aqueous seeds extract on PCV (%) in birds.

Group of birds	Concentration (mg/kg)	Pre-treatment (mean \pm SD)	Post-treatment/ days (mean \pm SD)			P-Value (p<0.05)
			7 th day	14 th day	21 st day	
1	+veControl	*20.33 \pm 0.21	*20.28 \pm 0.16	*19.43 \pm 0.13	*18.23 \pm 0.09	
2	Datura seed extract (100mg/kg)	*20.45 \pm 0.42	*20.56 \pm 0.45	*21.32 \pm 0.29	*21.48 \pm 0.42	
3	Datura seed extract (300mg/kg)	*20.56 \pm 0.51	*20.62 \pm 0.58	*21.43 \pm 0.36	*22.72 \pm 0.54	

* Significant difference (P<0.05) between treated and control group .

Table(5):Effects of *Datura metel* aqueous seeds extract on TEC (million/cu mm) in birds.

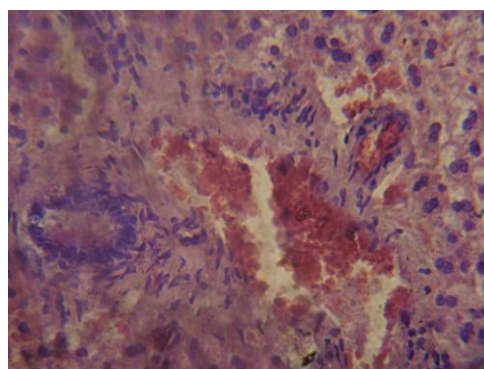
Group of birds	Concentration (mg/kg)	Pre-treatment (mean \pm SD)	Post-treatment/ days (mean \pm SD)			P-Value (p<0.05)
			7 th day	14 th day	21 st day	
1	+veControl	*15.36 \pm 0.04	*15.30 \pm 0.01	*14.45 \pm 0.05	*13.22 \pm 0.03	
2	Datura seed extract (100mg/kg)	*15.45 \pm 0.06	*15.48 \pm 0.08	*15.65 \pm 0.16	*15.78 \pm 0.23	
3	Datura seed extract (300mg/kg)	*15.49 \pm 0.09	*15.63 \pm 0.13	*16.43 \pm 0.14	*16.52 \pm 0.23	

* Significant difference (P<0.05) between treated and control group .

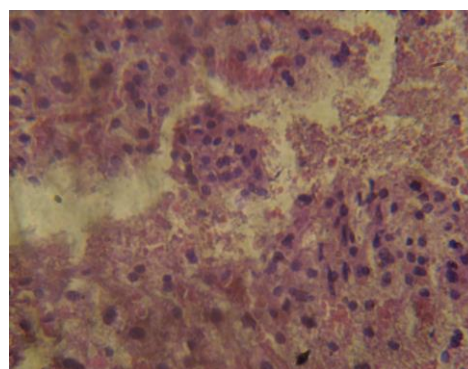
Table (6): Effects differ concentration of *Datura* aqueous seed extract on parasites in birds

Group of birds	Concentration (mg/kg)	Pre-treatment (mean \pm SD)	Post-treatment/ days (mean \pm SD)			P-Value (p<0.05)
			7 th day	14 th day	21 st day	
1	+veControl	*60 \pm 0.61	*62 \pm 0.52	*64 \pm 0.5	*70 \pm 0.59	
2	Datura seed extract (100mg/kg)	*60 \pm 0.72	*55 \pm 0.66	*50 \pm 0.21	*45 \pm 0.11	
3	Datura seed extract (300mg/kg)	*60 \pm 0.34	*50 \pm 0.23	*30 \pm 0.10	*10 \pm 0.0	

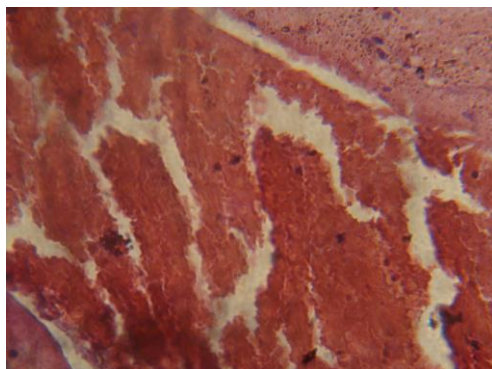
* Significant difference (P<0.05) between treated and control group .



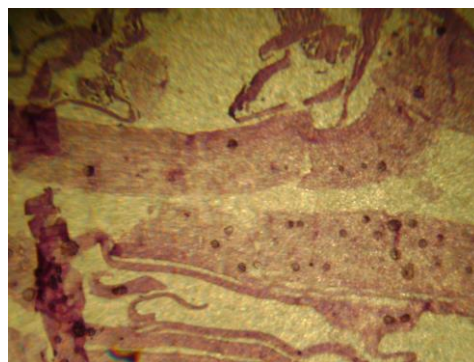
Plate(1):Photomicrograph of Section of Liver infected birds, Note: Coagulation Necrosis, edema hepatic cellular infiltrations and congested blood vessels. H&E Stain (40X).



Plate(2):Photomicrograph of Section of Liver infected and treated with aqueous extract of *Datura metel* seeds in birds, Note: Normal hepatic cell distribution. H&E Stain (40X).



Plate(3):Photomicrograph of Section of Lung infected birds, Note: congested blood vessels, haemosiderosis, interalveolar septae extended and filled some alveoli. H&E Stain (40X).



Plate(3):Photomicrograph of Section of Heart infected birds, Note: necrosis of myocardial cells, infiltrated few in mononuclear and polymorphonuclear cells. H&E Stain (40X).

Discussion

These study showed that the numbers of dead animals increased with the increase of extract doses, consider of the aqueous extract of *Datura metel* seeds are more toxic effective for the birds used in the experiment with high concentrations, this result is agreement with (Al-Toma *et al.*,2008) in their study of toxicity for aqueous of the *Datura metel* seeds where showed that the total alkaloid was very toxic with oral LD₅₀ as 0.18 g/kg, the results also indicated that females were more tolerant than males in mice infected by meracidia of Nematoda (Table 1).

The significant weight loss observed among the infected birds is in agreement with the findings of Al-Quraishi,(2009). Loss of weight in the infected group, especially after infection, may be due to anorexia (poor feeding) and the intake of some of the host's nutrients by the parasite, such as amino acids and glucose, reduction in food intake, injury to intestinal wall and hemorrhage resulting in poor weight gain of host and electrolytes, vitamins as result of intestinal obstruction (Haseeb *et al.*,2002).

The increased values of body weight in birds of the treated groups were not significant on day 7 and day 14 but that

were significant on day 21 compared to control which reached to *25.36% with *Datura metel* aqueous seeds extract by 300 mg/kg compared with control when were *10.22% after 21 day from treated, might be due to decreasing the parasitic load as a result of *Datura metel* aqueous seeds extract treatment which might increase proper absorption and metabolism of feed nutrients.

The increases were significant lead to glucose and protein levels were increased in body weight (Wannang *et al.*,2009)

Gidado *et al.*,(2007) reported that administration of *Datura stramonium* aqueous seeds extracts of the plant at a higher dose produced significant increase in body weight change, The present study showed significant differences in both body weight changes and feed intake, suggesting that extract had possible effect on body weight and nutrient utilization of the rats (Table 2).

The oral administration of *Datura metel* aqueous seeds extract significantly increased the hemoglobin level in birds. The increase of hemoglobin level was highest (40.96 g/dL%) on 21st day after treatment, The present findings support the report of

Thomas *et al.*, (2013) showed that in all treated groups were haemoglobin estimation increased after administration of *Datura stramonium* aqueous seeds extract, high Hb values advantage in terms of the oxygen carrying capacity of the blood and an indication that the presence of the alkaloid in the extract did not have a detrimental effect on the animal. But in control group Hb content was decreased due to effect of parasitic infestation, lead to loss in produced of blood cells from bone marrow is responsible for manufacture, the injury by *A.galli* cause faulty or damaged thereby affect the Hb values (Ali,2008) (Table 3).

In control group of the birds in the infected had lower packed cell volume values ,This could be contributed to the effects of larval migration in the tissue phase of the life cycle of the parasite, which involves some blood loss or may be due to consideration of nematodes infestation one of factors that associated with formation of the free radicals which play important a role in tissue injury and have reverse effects on erythrocytes (Islam *et al.*,2008) while Adang *et al.*, (2010) reported there was blood tinged diarrhea combined with *A. galli* infestation, also there was a necrosis of intestinal villi, glands and muscularis mucosa, all that lead to decrease numbers of red blood cells first directly by haemorrhage.

the higher Packed Cell Volume values observed in the birds in the treated groups, might be due to haemoconcentration, sequel to the diarrhoea, that due to decrease in infested worms observed in some birds with *Datura metel* aqueous seeds extract.

The findings of this study support that PCV with Tambuwal *et al.*, (2002) (Table 4).

The administration of *Datura metel* aqueous seeds extract increased the number of erythrocytes of birds. The highest number of cells was recorded on 21st day of treatment groups, TEC was increased, because of destruction of parasites by the anthelmintic action of *Datura metel* aqueous seeds extract. The increase could be as a result of the extract acting as a stimulant (Ganong,2005) in control group TEC was decreased due to effect of parasitic infestation on hematopoietic system and RBC (Table 5).

Datura metel is known to contain highly toxic tropane alkaloids and compounds atropine and scopolamine which consider pharmacologically active matter (Gidado *et al.*,2007). *Datura metel* extract as anthelmintics decrease the number of *A. galli* in birds in group 2 and 3 on day14th and 21st (Table 6). The highest decrease number of parasites was recorded on 21st day of post treatment. When is the result of histopathological no significant change in any internal organs of the birds of treated groups were found. Similar finding has been reported by similar finding has been reported by (Wannang *et al.*,2009). Or could be due to the presence of tannins, alkaloids and flavonoids which have been reported to killed nematodes (Umar,2012) which due to decreasing in worms in birds, They were affecting on absorption of amino acids and essential nutrients for protein syntheses, as a researches showed that *A. galli* also can stimulates a strong antibody response (Gaully *et al.*,2007).

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