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Experimental Visceral Larva Migrans in Chicken With Toxocara Canis*

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Abstract: The aim of this study was to determine the distribution of Toxocara canis larvae in some organs of chicks and to clarify if the larvae found in brain will be able to lead to the behavioral disorder or not. For this purpose, 42 15-day-old broiler chicks were allocated to 6 groups, each consisted of 5 trial and 2 control animals (Totally 30 exp. and 12 contr. anim.). Each experimental chick recevied 5000 embriyonated T. canis eggs orally. All animals were necropsied between 2^{nd} and 12^{th} days after inoculation with two day intervals. Brain, lung, liver and a half carcass of animals were digested in the pepsin-HCL solution and the digested organs were examined for the presence of larvae.

The recovery rates of larvae varied between averages of 11.6% and 24.6% according to the groups and between 2.74% and 46.5% individually. The larvae were found in the livers of all (100%) the experimental animals, in the lungs of 24 (80%) of them and in the brains of 6 (20%) of them, but no larva was detected in their carcasses. The distribution rates of recovered larvae according to the groups were between 92.87% and 99.83% in liver, between 0.17% and 7.13% in lung and between 0% and 0.14% in brain. No larva was detected in control animals. No behavioral disorder was observed in either control or experimental animals.

Key Words: Visceral larva migrans, Toxocara canis, chicken.

Civcivlerde Toxocara Canis'le Deneysel Larva migrans

Özet: Bu çalışma Toxocara canis'in yumurtası ile enfekte edilen civcivlerde larvaların organlardaki dağılımını ve beyindeki larvaların davranış bozukluğuna yol açıp açmadığını belirlemek için yapılmıştır. bu amaçla 42 adet broiler civcivi, herbirinde 5 deneme ve 2 kontrol hayvanı bulunan 6 gruba bölündü (Toplam 30 deneme ve 12 kontrol hayvanı). Deneme hayvanlarına 5000'er adet larvalı T.canis yumurtası ağız yoluyla verildi. İnokülasyondan sonra 2. ve 12. günler arasında 2'şer gün arayla tüm grupların nekropsisi yapıldı. Civcivlerin karaciğer, akciğer, beyin ve yarım karkasları sindirim sıvısında eritilerek larvalar arandı.

Larva ele geçirme oranı gruplara göre %11.6- %24.6, fertlere göre %2.74-%46.5 arasında değişti. Deneme hayvanlarının tamamının (%100) karaciğerlerinde, 24'ünün (%80) akciğerlerinde ve 6'sının (%20) beyninde larva görüldü, karkaslarında ise larvaya rastlanmadı. Gruplara göre elde edilen larvaların %92.87-%99.83'ü karaciğerlerde, %0.17-%7.13'ü akciğerlerde ve %0.14'ü beyinde bulundu. Kontrol hayvanlarında larva görülmedi. Ne kontrol ne de deneme grubu hayvanlarında davranış bozukluğuna rastlanmadı.

Anahtar Sözcükler: Viseral larva migrans, Toxocara canis, tavuk, civciv.

Introduction

Toxocara canis larvae cause Visceral Larva Migrans (VLM) in man and various animals including poultry (1-5). Nagakura et al. (6) reported the possibility of the tranmission of T. canis larvae from Japanese quail to people by eating raw poutry liver. There are various reports (1-3, 7-9) on the distribution of T. canis larvae in different organs of birds. In these studies, no information was available about the behavioral disorders caused by the larvae found in the brain of birds. However, some reports (10-12) emphasized the behavioral disorders in mice. The aim of this study was to determine the distribution of larvae of T. canis in organs of chicks and to clarify if the larvae found in brain would be able to lead to the behavioral disorder or not.

Materials and Methods

In this study 15 days old, 42 broiler chicks were used. Chicks allocated to 6 groups, each consisted of 5 trial and 2 control animals.

Toxocara canis eggs were collected from the uteri of female parasites, they were then embriyonated in 1% formalin saline (9, 13) at 27°C and kept at 4°C until used. Experimental chicks received 5000 embriyonated T. canis eggs orally. After inoculation, all animals were

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necropsied between 2nd and 12th days with two day intervals. Brain, lung, liver and a half carcass of animals were chopped up and put in to a solution containing 0.5% pepsin, 0.7% HCl in normal saline (14) for digestion. After digestion, the samples were examined for the presence of larvae and larvae were counted under the stereoscopic microscope.

The chicks were observed for the behavioral disorders until sacrified and the remarkable gross lesions were recorded at necropsy.

Results

The remarkable gross pathological changes in the experimental chicks were soft and pale liver with linear hemorrhages in group 1 and 2 (necropcied 2 and 4 days after inoculation) and darkened lung in group 2 and 3 (necropcied 4 and 6 days after inoculation), no gross pathological change was seen in control animals. In neither control nor experimental animals, any behavioral disorder was observed. The distribution and recovery rates of larvae are given in Table.

Discussion

The recovery rates and larval distribution of our study are simiar to those of other studies (2-3, 7-9, 15).

In the studies conducted in chicken (1-2, 7-9), quails (3, 15-16) and pigeons (9), infected with 1500-15000 embryonated T. canis eggs indicated that the larvae always accumulated in very great numbers in liver independent of the infection time. In this study, 5000 embriyonated T.canis eggs were used to infect chicks and similar results were obtained.

Maruyama et al. (2) suggested that the carcass was the 2 nd organ for selection and larval accumulation. This

Table. Number of larvae recorved from livers (Li), lungs (Lu), brains (Br), and carcasses (Ca) of experimental (E) and control (C) chicks; the distribution rates (D%) of larvae in organs; and the recovery rates (R%) of larvae from chicks.

	Gr-1 (necropcied 2 days after inoculation)										Gr-2 (necropcied 4 days after inoculation)									
	Li.	D%	Lu.	D%	Br.	D%	Ca	D%	Tot.	R%	Li.	D%	Lu	D%	Br.	D%	Ca.	D%	Tot.	R%
E1	512	88.73	65	11.27	0	0	0	0	577	11.5	850	96.37	32	3.63	0	0	0	0	882	17.6
E2	1456	97.33	40	2.67	0	0	0	0	1496	29.9	405	84.38	75	15.63	0	0	0	0	480	9.6
E3	426	87.12	63	12.88	0	0	0	0	489	9.78	1820	99.4	9	0.49	2	0.1	0	0	1831	36.6
E4	1270	96.21	50	3.79	0	0	0	0	1320	26.4	1110	96.35	42	3.65	0	0	0	0	1152	23.0
E5	1048	87.92	144	12.08	0	0	0	0	1192	23.8	1440	99.11	12	0.83	1	0.1	0	0	1453	29.1
Tot	4712	92.87	362	7.13	0	0	0	0	5074	20.3	5625	97.02	170	2.93	3	0.1	0	0	5798	23.2
Ave	942.4		72.4		0		0		1014.8		1125		34		0.6		0		1159.6	
C1	0		0		0		0		0		0		0		0		0		0	
C2	0		0		0		0		0		0		0		0		0		0	

	Gr-3 (necropcied 6 days after inoculation)										Gr-4 (necropcied 8 days after inoculation)									
	Li.	D%	Lu.	D%	Br.	D%	Ca	D%	Tot.	R%	Li.	D%	Lu	D%	Br.	D%	Ca.	D%	Tot.	R%
E1	1433	99.72	4	0.28	0	0	0	0	1437	28.7	116	84.67	21	15.33	0	0	0	0	137	2.74
E2	768	96	32	4	0	0	0	0	800	16	ne	?	(0)	?	(0)	?	(0)	?	(0)	?
E3	1567	100	0	0	0	0	0	0	1567	31.3	ne	?	(3)	?	(0)	?	(0)	?	(3)	?
E4	1050	99.62	4	0.38	0	0	0	0	1054	21.1	ne	?	(33)	?	(0)	?	(0)	?	(33)	?
E5	436	98.42	6	1.35	1	0.23	0	0	443	8.86	2324	100	0	0	0	0	0	0	2324	46.5
Tot	5254	99.11	46	0.87	1	0.02	0	0	5301	21.2	2440	99.15	21	0.85	0	0	0	0	2461	24.6
Ave	1050.8		9.2		0.2		0		1060.2		1220		10.5		0		0		1230.5	
C1	0		0		0		0		0		0		0		0		0		0	
C2	0		0		0		0		0		0		0		0		0		0	

	Gr-5 (necropcied 10 days after inoculation)										Gr-4 (necropcied 8 days after inoculation)									
	Li.	D%	Lu.	D%	Br.	D%	Ca	D%	Tot.	R%	Li.	D%	Lu	D%	Br.	D%	Ca.	D%	Tot.	R%
E1	872	97.43	21	2.35	2	0.22	0	0	895	17.9	1397	100	0	0	0	0	ne	?	1397	27.9
E2	360	97.56	8	2.17	1	0.27	0	0	369	7.38	690	99.57	3	0.43	0	0	ne	?	693	13.9
E3	752	98.30	12	1.57	1	0.13	0	0	765	15.3	903	100	0	0	0	0	ne	?	903	18.1
E4	480	93.57	33	6.43	0	0	0	0	513	10.3	1110	100	0	0	0	0	ne	?	1110	22.2
E5	352	97.24	10	2.76	0	0	0	0	362	7.24	1710	99.59	7	0.41	0	0	ne	?	1717	34.3
Tot	2816	96.97	84	2.89	4	0.14	0	0	2904	11.6	5810	99.83	10	0.17	0	0	?	?	5820	23.3
Ave	563.2		16.8		0.8		0		580.8		1162		2		0	0	?		1164	
C1	0		0		0		0		0		0		0		0		0		0	
C2	0		0		0		0		0		0		0		0		0		0	

Each experimental chick was infected with 5000 eggs
ne= not examined because of putrification
In Gr-4, the values in brackets were not evaluated in total sums and averages.

result was obtained from only one bird out of 6 chicks. Agnithori et al. (1) recorded average 4.40 larvae from carcasses of chicks and Nakamura et al. (3) between 0 and 288 larvae from the carcasses of Japanese quails. In our study no larva was detected in carcasses. Similar result has been reported by Sharma and Bhatia (8) and Okoski and Usui (7).

In some studies (1-3, 9), small numbers of larvae were found in brain. Galvin (9) found between 1-6 larvae in brains of 12 out of 17 chicks, Agnithori et al. (1) 1.8-2.6 ones in 30 chicks, Nakamura et al. (3) 1-10 in 16 out of 26 Japanese quails and Maruyama et al. (2) 1 larvae in 1 out of 6 chicks. In the above mentioned studies, no information was given about the presence of behavioral disorders in birds. In this study the number of larvae found in brain was 2 in each 2 animals and 1 in each 4, and no behavioral disorder was observed in these animals as well as other experimental and control animals.

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