

## **A STUDY ON PIGEONS(*Columba livia*) CESTODES INFECTION IN DIYALA PROVINCE.**

**Naghm Yassin Al-Bayati**

**Department of Biology- College of Education(Al-Razi)- University of Diyala**

### **ABSTRACT**

The study was conducted to identify different cestodes infecting pigeons from various regions in Diyala province. The total prevalence were 73.01%. Three genera of cestodes were diagnosed and identified (*Aporina delafondi* , *Cotugnia intermedia* and *Raillientina microcantha* ). Parasitological findings of feces and guts examined for all type of cestodes in birds revealed three degree of inflections depending on the number of worms/bird. The results showed that the infected birds had significant decrease in P.C.V. (20.93%), Total number of R.B.C. ( $2.28 \text{ c} \cdot 10/\text{mm}$ ) and HB concentration (5.88 gm/100ml) in birds especially in severe (heavily) infections with cestodes. Results also show increase in total white blood cells (leucocytosis) specifically eosinophils ( $22.03 \text{ c} \cdot 10/\text{mm}$ ) in infected pigeons. The results showed bad biometric status and bad nutrient as compared with control group.

### **INTRODUCTION**

Pigeons ,whose relation with traces back to ancient time, are cosmopolitan birds (Sari *et al.*, 2008) and those of the order Columbiformes can be found in virtually every town and city around the globe (Merques *et al.*, 2007). They are bred as a source of food, as a hobby, as cultural and religious symbols and for experimental aims (Shaheen *et al.*, 2005). Parasitism is gradually being accepted as one of the major selective forces affecting avian life histories. The poultry industry has been confronted with various parasitic disease of economic significance (Anwar *et al.*, 2000). Like other domestic poultry, pigeons have shown high prevalence of gastrointestinal helminthes and protozoan infections (Ghazi *et al.*, 2002). They constitute a major source of infection and transmission of disease for humans and his economic birds such as chickens and ducks (Patel *et al.*, 2000). Humans are infected by fecal dust from cages or from sites that been contaminated with dry feces, urine and other droppings (Marques *et al.*, 2007). Endoparasitism is one of more important disease occurrence of different species of cestode in poultry has been reported (Dranzoa *et al.*, 1999). Endoparasites dilate the intestine, produce nodule and severe enteritis, thus impairing the absorbing power of intestine for nutrients and vitamins from the host

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(Anwar *et al.*, 2000). The resultant situation leads to loss of body weight , retarded growth, reduced egg production, weakened body resistance and even death (Borghare *et al.*, 2009). Significant differences in Hb, PCV, RBCs values were reported between infected chicken with cestodes and non infected chicken (Saeed *et al.*, 2009). Although wild and domestic *Columbia livia* are naturally spread in most cities and villages in Iraq(Al-Bakry, 2009), no studies have been performed in relation to helminthes infections in pigeons. The aim of this study was to determine the prevalence and intensity of cestodes of *Columbia livia* in Diyala province and obtain some information about the effects of the infection on biometric factors of pigeons since there was little studies on this birds and non in Diyala.

## MATERIALS AND METHODES

Eight different sites were selected within the Diyala province including : Balad Rouz, Mendeli, Al-Khalis, Al-Tahreer, Bohriz, Al-Ehweider, Center of Baquba, and Baquba Eljedeeda in period between October 2009 and April 2010. Twelve birds were randomly sampled from each sites and transmitted to laboratory of biology department in Al-Razi education college. The total number of birds were 96. Fifty of these birds were males and 46 were females. Fecal samples from each birds were examined for eggs and proglottides of cestodes by direct smear technique and sedimentation tests.

Two blood samples were collected from each pigeons using insulin syringe inserted through a venipuncture of wing and always taken before morphometric measurements were made, in order to prevent the stress of birds. The first blood sample was kept in EDTA tubes until the tests was done in laboratory. According to Norte *et al.* (2008) microhematocrit method (capillary tube ) was done by using the hemato centrifuge at 1200 rpm/min for 5 minute to determine P.C.V. ( packed cell volume). Hemoglobuline (Hb) was measured by using Drabkin solution by using spectrophotometer and Digital blood cell counter (Al-Safaar and Al-Mawla, 2008). Red blood cell (RBC) and White Blood Cell (WBC) counts were made within 24 hours. Differential WBC counts were made by Wright and Giemsa–stained smears. The second blood samples from each pigeons were used for other chemistry tests (Total protein concentration, albumin, calcium, phosphorus, and magnesium). These samples were immediately centrifuged to separated the plasma for biochemical values and kept at refrigerator (Lumeij *et al.*, 1988). Sex , length of the wings cord and weight were recorded for each bird. The body condition index which represent Weight (g)/Wing length(cm) were counted according to Vázquez(2010). Some information

were reported such as kind of food that found in gizzard and placed where they captured.

Then the postmortam examination was done for all captured birds according to Morand and Poulin (2000), after decapitation, the abdominal and thoracic cavity were opened, followed by systemic autopsy examination for all digestion tract. The digestion tract was opened longitudinally after it was removed from the body and placed in petri dish. The contents were carefully washed through a 100  $\mu$ M mesh test. The worms removed carefully to petri dish and rinsed with normal saline then they were retained in water for 2-3 minutes to relax. Finally, the worms were examined under light microscopic and all helminthes were counted for each pigeons before being fixed in 4% formaldehyde solution for further identification. Using standard techniques they were stained in iron acetocarmine ( Zangana, 1982), dehydrated in ethanol series, cleared in clove oil and mounted in Canada balsam (Mosffee, 2010). The worm were identified according to Yamegutii (1959) and Soulsby (1986). The number, position, size and morphological characteristics of testes and ovaries and hooks were used for identification. The number of worm were recorded and the intensity and percentage of infection were counted. The intensity of infection was determine according to Muhsin (2008): light infection when there were 1-10 worms/pigeon and, moderate infection when there were 11- 20 worms/pigeons and heavy infection when there were 21 and more in pigeon. The birds without infection was considered as control. Statistical analysis related to the obtained results was performed using T- test and L.S.D. %50.

## RESULTS AND DISCUSSION

The present investigation demonstrated that the prevalence with cestodes in pigeons (*Columba livia*) was found to be 73% (table 1). This result is higher than the result recorded in Nineva and some areas of Erbil and Duhouk provinces (0.66%) and in Al-Basrah (67.4%) as shown by Zangana (1982) and Mustafa (1984) , respectively. These result may be due to abundance and presence of intermediate host (like ants, cockroaches, beetles, earthworms and some mollusks), the host species and its feeding habits and other climate factors like temperature (as it may effect on the presence of intermediate hosts) and other geographical factors (Zangana, 1982; Soulsby, 1986, Mustafa, 1984). The higher rate of infection was in Al-Ehwieder and in Balad Rouz (91.7%) while the lowest was in Baquba Al-jedeeda (50%) as shown in table (1), thirty eight males (39.6%) were infected with cestodes while thirty two female

(32.3%) were infected with no significant differences between them at P value 0.05 as shown in table (1). Places where the pigeons were captured are statistically significant one ( table 1). The result may reflect the effect of feeding habits. Diet contaminated with infectious particles or food born toxins enable direct or indirect contact between affected and naive individuals facilitating disease transmission (Graczyk *et al.*, 2007). On the other hand it may reflect the fact that pigeons were in contact with other poultry and animals that may be infected with parasites (Sari *et al.*, 2008). Infected birds are usually in apparent, and will clear infections within few weeks, shedding organisms in their feces for a short time during infection then uninfected birds picked up infection from contaminated environments (Dæhlen, 2003). The resultant situation may lead to infect more number of pigeons that contact with this environments (Dæhlen,2003; Graczyk *et al.*, 2007). In this study all these factors play roles in transmission of infection to the birds which captured near the source of grains, markets, and houses. So, the feeding habits of these birds were varied and they were in contact with other animals which may be infected. In this study, it has been proved that gender factor is not important in helminth infections in pigeons as shown in table (1). Previous studies have been reported that the effect of gender was also unimportant for helminth infection in pigeons (Sari *et al.*, 2008).

**Table 1.** Number and percentage infection for pigeons infected with cestodes in each regions in Diyala province.

Study sites	No. examined birds	No.& (%) in infected birds	Male		Female	
			Examined bird	No.&(%) in infected birds	Examined bird	No.&(%)in infected birds
Al-Tahreer	12	8(66.7)	6	5(41.7)	6	3(25.0)
Al-Ehweider	12	11(91.7)	7	6(50.0)	5	5(41.7)
BaqubaAl-jadeeda	12	6(50.0)	8	4(33.3)	4	2(16.7)
Mandeli	12	7(58.3)	5	3(25.0)	7	4(33.3)
Balad Rouz	12	11(91.7)	6	5(41.7)	6	6(50.0)
Baquba center	12	8(66.7)	3	3(25.0)	9	5(41.7)
Buhriz	12	9(75.0)	8	6(50.0)	4	3(25.0)
Al-khalis	12	10(83.3)	7	6(50.0)	5	4(33.3)
L.S.D. P value 0.05		6.243		4.702		5.009

The helminthes species detected in the fecal and autopsy samples of pigeons including: *Aporina delafondi*, *Cotugnia intermedia* and *Raillientina microcantha* (table 2). The rates of infection were *R. microcantha* 36.5%, *A. delafondi* 14.6% and *C. intermedia* was 21%. The mean of parasites number for each helminthes was shown in table (2). The results shown that the mean of parasite number for three species helminthes were close. Although majority of pigeons carried single worm species mixed infection of up to two species were recorded and total number of worms per bird ranged between 1- 230 (table 2). The most common species among cestodes was found to be *R. microcantha* (36.5%). This disagree with other study such as Zangana (1982) who mentioned that all infection have the same rates (0.22%) this due to the many factors (climates, presence of intermediate hosts susceptible for the parasites). Although *R. microcantha* is generally considered to be relatively harmless parasites (Mosffee *et al.*, 2010), it will be interesting to study the reason of pigeons to be more susceptible to *R. microcantha* compared with other helminthes. However, the intensity of this cestodes and other two species play large role in determining whether the parasites are pathogenic to the host (Sari *et al.*, 2008). In this study the effect of this parasites was increase and be noticeable in heavy infection as shown of its effects on blood parameters table (3).

**Table 2.** *Species of Cestodes recorded, the percentage and intensity of infection in infected pigeons.*

Cestodes	No. examined birds	No. infected birds	Percentage of infected birds	Total number of cestode in infected bird	Mean of intensity
<i>Aporina delafondi</i>	96	19	14.6	90	4.74
<i>Raillietina micranth</i>	96	35	36.5	230	6.57
<i>Cotugna intermetia</i>	96	20	21.0	145	7.25

The relationship between body condition and biometric measurements of physical parameter of pigeons and blood parameters with infection were shown in tables 3, 4, 5. The Hb concentration and mean number of RBC were higher in control group (11.40 gm/100 ml and 4.89 c\*10/mm, respectively) compared with infected birds (table 3). The lowest concentration of Hb and the lowest mean number of R.B.C. were in the birds with heavy infection (5.88gm and 2.28 c\*10/mm, respectively) and the higher rates were in light infection as shown in table (3). The rate of P.C.V. was show

same results of Hb concentration it was decrease with increasing of infection as shown in table (3). The mean of W.B.C. numbers were increase in infected pigeon compared with control group, the mean number of W.B.C. were increasing according to increase in intensity of infection (Table 3).

Many studies had been reported that the blood parameters most commonly associated with health of individuals and serological and hematological values could be an important source of information and could provide or support an objective assessment of the health status especially the values of P.C.V., R.B.C. and Hb concentration (Toro *et al.*, 1999; Schulz *et al.*, 2000; Norte *et al.*, 2008; Lashev *et al.*, 2009). Significant decrease in the rate of Hb, P.C.V. and RBC were shown in infected pigeons compared with control group (table 3). The present study agree with Saeed *et al.* (2009) who reported significant decrease in the values of these parameters in infected chicken with cestodes compared with non infected. The maximum rate of these parameters were shown in heavy intensity of infection compared with two other group of intensity infection. These results in agreement with several workers that reported by Ullah *et al.* (2005) and Al-Saffar & Al-Mawla (2008) and Saeed *et al.* (2009) who reported that the heavy infection with parasites (lice, cestodes and other parasites) can lead to blood loss anemia in birds, P.C.V. is quickest and most practical method for evaluation the red cell mass of birds. The mean number of WBC was increased with increasing of intensity of infection. These result reflect that infection with these parasites appeared to be associated with hematological changes and this may reflect immune response in the birds (Muhsin, 2008). Furthermore, leucocytoses and heterophilia had been reported in parasitic diseases in birds (Al-Saffar & Al-Mawla, 2008; Muhsin, 2008). Eosinophilia was predominant and very characteristic feature seen in birds infected with parasite specially moderate and heavy infection. Al-Saffar & Al-Mawla (2008) had reported that leucocytoses refer to an absolute increase in total number of white blood cells in circulation caused by inflammation, resulting from parasitic infections the present study also show the same results.

**Table 3.** *The effect of intensity infection on hematological parameters of pigeons infected with cestodes.*

Groups	Hb gm/100 ml	PCV (%)	RBC: $c \times 10/mm$	WBC $c \times 10/m$
No infection	11.40	40.49	4.89	15.01
Heavy infection	5.88	20.93	2.28	22.03
Moderated infection	8.01	25.99	4.01	19.21
Light infection	9.69	36.01	3.99	18.01
L.S.D. P value 0.05	2.977	7.820	1.630	5.489

The mean of weight were lower in infected pigeon compared with control (Table 4 ). The infection with cestode shown significant effect on body condition index (Weight/length of wing) at P value 0.05 and the effect was increase with increase of intensity of infection as reported in table (4). This agree with many study which recorded that the infection of parasites caused in malnutrition and loss of weight (Turk, 1971; Morand and Poulin, 2000; Dæhlen, 2003). Table (4) show that the effect of intensity infection on biometric parameters of pigeons was increase when the intensity was increased. The pigeon with higher intensity of infection appeared lethargic and combined with the effect of high cestodes infection bringing about a chronic syndrome characterized by low growth rate and emaciation and weakness this agree with Dranzoa *et al.* (1999) who showed that cestodes may consume large quantities of nutrients of pigeons and thus regarded as the most destructive louse of birds word wide.

Dæhlen (2003), was reported that Norwegian studies have shown that cestodes can effect the health of willow grouse by causing loss of weight and by weakening the skeleton. It was also been reported that cestodes infection reduce the health condition of the birds and therefore, more vulnerable to predation. The infection of nematodes (*Ascaridia galli*) caused in low health condition in chicken as reported by Dahl *et al.* (2002). They mentioned that the infection with this nematode caused in severe effect on the birds and this increased when combined with bacteria infection. Ghazi *et al.* (2002), show that the direct effect of the infection were reduction of body condition, body weight, adult survived , clutch size, hatching successes and chick survival. Results in the current study are consistent with these studies showed that the cestodes infection may be accompanies with malnutrition and lead to weight loss, as well as production

**Table 4.** *The effect of intensity infection on biometric parameters of pigeons infected with cestodes.*

Group	Mean of weight(g)	Mean of length wings(mm)	BCI(gm/mm)*
No infection	280.8	233	1.21
Heavy infection	138.1	230	0.60
Moderated infection	193.4	236	0.82
Light infection	200.8	229	0.88
L.S.D. P value 0.05	5.570	8.730	0.091

Total protein and albumin concentration were decrease in infected pigeon compared with control as shown in table 5. The protein values were significant increase (at P values 0.05) in control group compared with other groups that shown no significant changes among them. There was no significant different among groups of the values of Calcium, phosphorus and magnesium.

**Table 5.** *The effect of intensity infection on Albumin, total protein, Calcium, Phosphorus and Magnesium values of pigeons infected with cestodes.*

Group	Albumin (g)	Total protein(g)	Calcium (mg/dl)	Phosphorus (mg/dl)	Magnesium (mg/dl)
No infection	2.01	4.95	14.40	8.40	3.90
Heavy infection	1.51	2.93	13.45	8.19	3.32
Moderated infection	2.06	3.01	13.01	8.33	2.91
Light infection	2.80	3.71	14.23	8.43	3.76
L.S.D. P value 0.05	0.987	0.947	1.338	0,109	0.955

Table (5) show that the blood chemistries (total protein, albumin) for pigeons were decrease in infected pigeons compared with control and they were lowest in heavy intensity while Calcium, Phosphorus and Magnesium were decreased in infected birds compared with non infected but they didn't affected with the intensity of infection. These results are in agreement with the fact that localized intestinal parasitic infections had been shown to profoundly affect the amount of certain nutrients

absorbed from parasitized intestines which depend upon the nutrient examined the area of the intestine attacked by the parasite, the stage of parasitic infection and the intensity of infection (Turk, 1971). The alterations in protein digestion and absorption seen when the intestine was damaged as a result of infection with parasites (Turk, 1971).

In conclusion a positive interaction between cestodes infection and health condition of pigeons were noticed especially in blood and biometric parameters and this relationship was increased with increasing of intensity of infection.

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## دراسة عن الإصابة بالديدان الشريطية في الحمام (*Columba livia*) في محافظة ديالى.

نغم ياسين البياتي

قسم علوم الحياة /كلية التربية الرازي /جامعة ديالى

### الخلاصة

تضمنت الدراسة تشخيص وتصنيف الديدان الشريطية التي تصيب الحمام في مناطق متعددة من محافظة ديالى. كانت الإصابة الكلية بالديدان الشريطية ٧٣% . تم تشخيص وتصنيف ثلاثة أجناس من الديدان الشريطية التي شملت (*Aporina delafondi* , *Cotugnia intermedia* and *Raillientina microcantha*). اظهر الفحص للبراز والأمعاء وجود ثلاث درجات من شدة الإصابة استنادا إلى عدد الديدان في كل طير. أوضحت نتائج فحص الدم وجود فقر دم في الطيور المصابة مقارنة بتلك غير المصابة مع انخفاض في مكدهم الدم PCV وانخفاض في العدد الكلي لكريات الدم الحمراء و انخفاض نسبة خضاب الدم Hb وخاصة في الحمام شديد الإصابة مقارنة بالحمام غير المصاب . كما لوحظ زيادة في العدد الكلي لخلايا الدم البيضاء وزيادة في نسبة الخلايا الحمضة مع سوء الوضع الصحي و التغذية مقارنة بمجموعة السيطرة.