# A STUDY ON THE PATHOLOGICAL AND DIAGNOSIS OF EIMERIA SPECIES INFECTION IN JAPANESE QUAIL

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## ABSTRACT

This study was conducted to detect the intestinal coccidial types in87Japanese quails *(coturnix coturnix japonica*)the birds were purchased from different parts of Nenevah governorate. The current study reveals that the total percentage of infection with *Eimeria* spp.oocysts 49.4%. Three species were diagnosed,according to their percentage they are*:E.tsunodai* 44.8%,*E. uzura* 34.5%,*E. bateri* 24.1%. The higher rates were in young birds. There was no significant difference with respect to sex. The results showed the higher infection rate and intensity was recorded in caecum infection with three species of *Eimeria* was most frequent in Japanese quails with percentage 46.5%. Macroscopical lesions of infected birds revealed thatsoftening of feces,thickening of mucosa and hemorrhagein caecum. Microscopically lesions characterized by sever hyperplasia of epithelial cell with construction of intestinal gland cavities in small intestine, caecum and presence of odema between muscle fibers with different development epithelial cells and infiltration with inflammatory cells. This study is regarded the first study in detection of species and pathological effect of *Eimeria*in Japanese quails in Nenevah governorate.

## INTRODUCTION

Coccidiosis is one of the most important and common protozoal disease in various avian species (1). This parasitic infection occurs in the epithelial cells of the intestine, it results in a greateconomic loss all over the world (2). Quails which consider a branch of the modern poultry industry.These birds are raised primarily for production of eggs,meat and used as laboratory animals similar to rats and mice (3, 4). Quails are most susceptible to various diseases such as coccidiosis which recognized as a serious parasitic disease problem limiting quail industry(5). Clinically coccidiosis is characterized by diarrhea loss ofappetites and ageneral appearance of malaise,weight loss, awatery diarrhea that may be greenish or bloody and retarded growth (6). In some cases anumber of quails died at 5-6 day occurred in experimental study(7). Various species of *Eimeria* I beenisolated from the different species of quails such as *E.tsunoda*i, *E.uzura,E.bateri* from*J*apanese quails (6) and*E .lophortygis,E .okanaganensis* described from California quailswhile *E.crusti,E.oreortygis* are described from mountain quail(8)and*E.conturnicis,E.bateri* are described from grey quail(4)and *E.colini,E.lettyae* from bob white quail(9)also *E.tahamensis* from Arabianquail(10). The present study was designed to provide preliminary information on the prevalence rates,type of *Eimeria* with describing both gross *and* microscopic changes caused by these parasites in Japanese quails in Nenevah governorate, Iraq.

## MATERIALS AND METHODS

This study was conducted on 87 Japanese quails(*coturnix coturnix japonica*)and were classified as young quails (less than 10 weeks)and adult(more than 10 weeks)from both sexes(45 females,42male) after slaughtered the Japanese quails fecal samples were collected directly from the duodenum,small intestine and caecum .direct

smear method(11)andsheathes flotation technique were used for diagnosis of oocysts of Eimeriaspp(12). Identified according on the site of infection, size of oocysts and sporocysts,presence or absence of micropyle(13, 14).according to (15)for detection the degree of intensity of infection with *Eimeria* spp.wet smears of mucosa were prepared from duedonum and small intestine and caecum scraping stained with Giemsa for microscopic examination of *Eimeria* spp.stage(16), the gross characteristics of the lesion were described and recorded. Selectively tissue specimens were collected,preserved in 10% formalin solution and processed by histopathological techniques and stained with haematoxylin and eosin and examined histologically for the presence of *Eimeria* spp.stage and pathological changes(17). The data were analyzed statistically by using chi-square(18).

## RESULTS

Out of the 87 Japanese quails examined during the study period,43 cases(49.4%)were positive for *Eimeria* spp. Three *Eimeria* sppwas identified in naturally infected birds belonged to *Eimeria tsunodai,Eimeriauzura,Eimeria bateri*(figure 1,2,3). Differentiation of *Eimeria* sp.was based on morphological specific feature and by microscopic measurements by using ocular micrometer(tables 1,2). The prevalence of *Eimeia* spp. and site of infection recovered from Japanese quails are given in(table 3).Ahigher percentage was reported in *Eimeria tosunodai* 44.8%. Statistical analysis showed significant differences between *Eimeria* sp.from(table 4) it is evident that there were three degree of infection according to the site of infection and intensity of infection with*Eimeria* sp. The highest rate of infection was found in young quails and lowest percentage in adult. Statistical analysis showed significant difference between the ages. While no significant

difference between male and female (table 5). The results reveal that high percentage of infection with three species of *Eimeria*(mixed infection) was 46.5% while single infection the lowest was 20.9%,with significant difference was observed between them(table 6) and presence of development stage of coccidia in scrupling stained with Giemsa stain(figure 4) this study including present of macroscopical pathological lesions represented by softening of feces in duodenum ,small intestine and more clearance in caecum,with thickening of mucosa and light hemorrhage in caecum while the histopathological lesion characterized by sever hyperplasia of epithelial cells with construction of intestinal gland cavities in small intestine and caecum (figure 5),with presence of developmental stage of parasite in epithelial layer lining of intestinal glands(figure6,7),infiltration with inflammatory cellsrepresented by esinophils and presence of edema between the musclefibers in small intestine and caecum (figure 8).

**Table(1):** The dimensions of the oocysts and morphological of *Eimeria*sppdetermined in Japanese quail.

| **Species** | **Oocyst size(µ)** | | **Morphology** | **Wall** | **Micropyle** |
|---|---|---|---|---|---|
| | **mean ± StE.** | **Range** | | | |
| ***E.tsunodai*** | 19-14.6<br>0.88±0.76 | (16-20)(18-14.5) | Ovoid | Double | _ |
| ***E.uzura*** | 23.4-17.7<br>2.02±0.61 | (19-28.5)(21.5-16) | Broaid ellipsoid | Double | + |
| ***E.bateri*** | 22-16.4<br>1.05±0.89 | (16-30) (21-14.5) | subspherical | Double | _ |

*(10-15)of the oocysts measured from each species

**Table(2):**The dimensions of the *Eimeria* sporocyst detected in the Japanese quails.

| Species | Sporocyst size(µ) | |
|---|---|---|
| | **mean ± StE.** | **Range** |
| ***E. tsunodai*** | (5.1-10.5)<br>O.4±0.83 | (10.7-9.1)(5.3-4.7) |
| ***E .uzura*** | (6-11.5)<br>1.2±0.8 | (12-10.8)(6-5) |
| ***E. bateri*** | (6.8-10.2)<br>0.5±0.9 | (11.2-8.5)(7-6) |

*(8-10)of the sporocyst measured from each species

**Table (3):**Prevalenceand the site of infection *with Eimeria* spp *in Japanese quails*

| *Eimeria species* | No.of positive | Rate of infection | Site of infection | | |
|---|---|---|---|---|---|
| | | | **duodenum** | **Small intestine** | **Caecum** |
| ***E.tsunodai*** | 39 | 44.8 [a] | – | – | – |
| ***E.uzura*** | 30 | 34.5 [b] | + | + | + |
| ***E.bateri*** | 21 | 24.1 [c] | + | + | + |

*different letters have significant differences at P≤0.05

**Table(4):** Distribution and intensity of infection with *Eimeria* spp. according to site of infection

| Organs | No.of positive sample | Rate of infection | Intensity of infection |
|---|---|---|---|
| **Duodenum** | 6 | 6.9% [a] | Lowdegree |
| **Small intestine** | 9 | 10.3% [a] | Moderatedegree<br>low degree |
| **Caecum** | 28 | 32.9 % [b] | High degree<br>low degree |

*rate with different letters have significant difference at p≤o.o5

Lowdegree: 5 oocyt/hpf.,Moderate degree: 10-15 oocyst/hpf.,High degree:50 oocyst/hpf.

**Table(5):**Relationship of*Eimeria infection* with sex and age in Japanese quails.

| Sex / Age of birds | Female | | | Male | | |
|---|---|---|---|---|---|---|
| | **No.of birds examined** | **No.+ve birds** | **Rate of infection** | **No.of birds examined** | **No.+ve birds** | **Rate of infection** |
| **Young birds** | 27 | 16 | 59.3% [a] | 26 | 16 | 61.5% [a] |
| **Adult birds** | 18 | 6 | 33.3% [b] | 16 | 5 | 31.3% [b] |
| **Total** | 45 | 22 | 48.9% [a] | 42 | 21 | 50% [b] |

Vertical different small letters have significant difference at P≤0.05.

Horizontaldifferent large letters no significant difference at P≤0.05.

**Table(6):** Type of infection with *Eimeria* spp.in Japanese quails.

| Type of infection | No.+ve birds | rate of infection |
|---|---|---|
| **Single infection** | 9 | 20.9% a |
| **Double infection** | 14 | 32.6% b |
| **Mixed infection** | 20 | 46.5% c |
| **Total** | 43 | 100 |

Different letters have significant differences at P≤0.05.

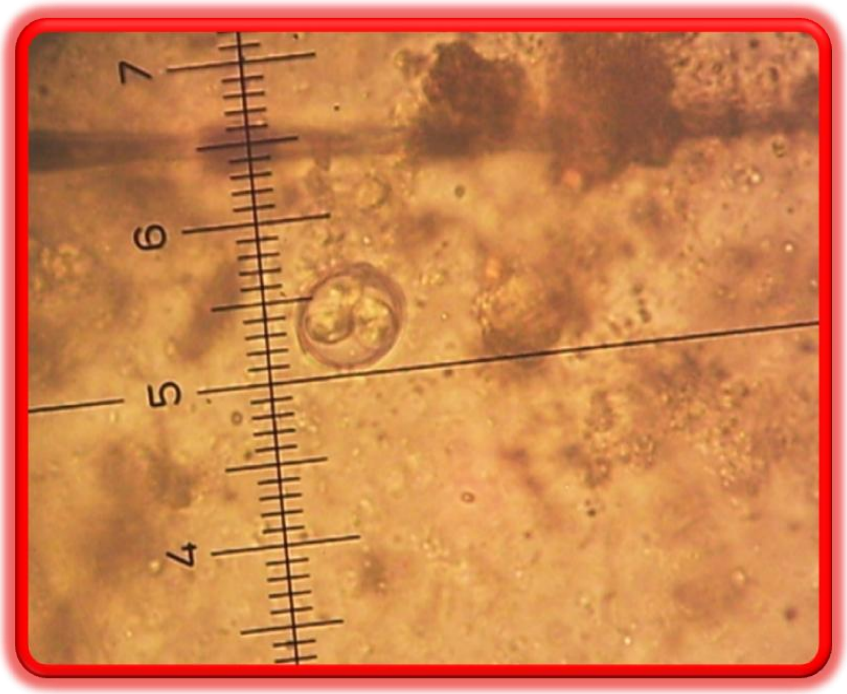


**Figure 1:***Eimeria tsunodai* oocyst by using direct smear method x400

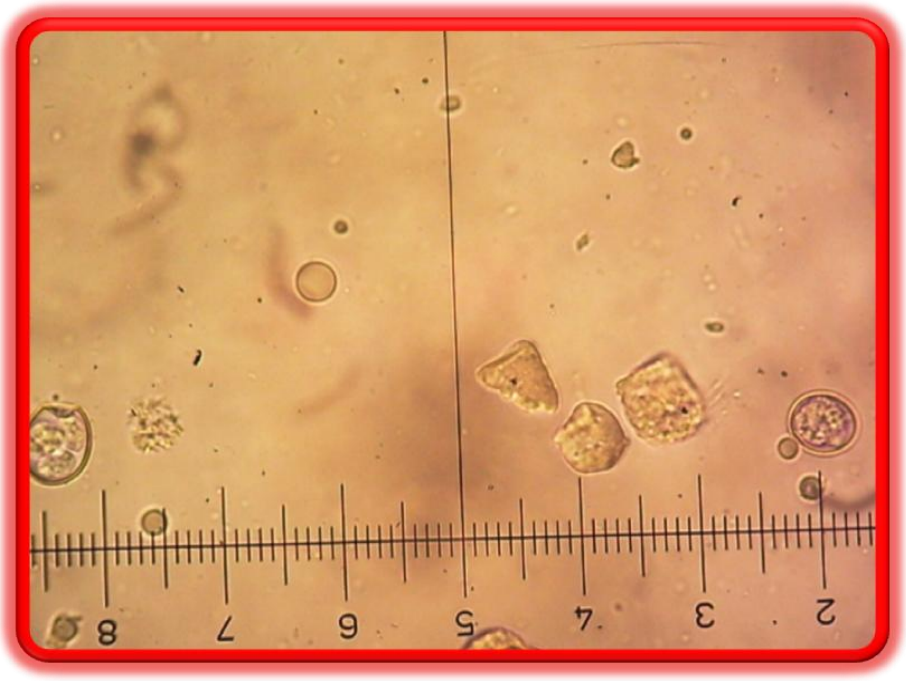

**Figure 2:***Eimeria uzura* oocyst by using flotation technique x400.

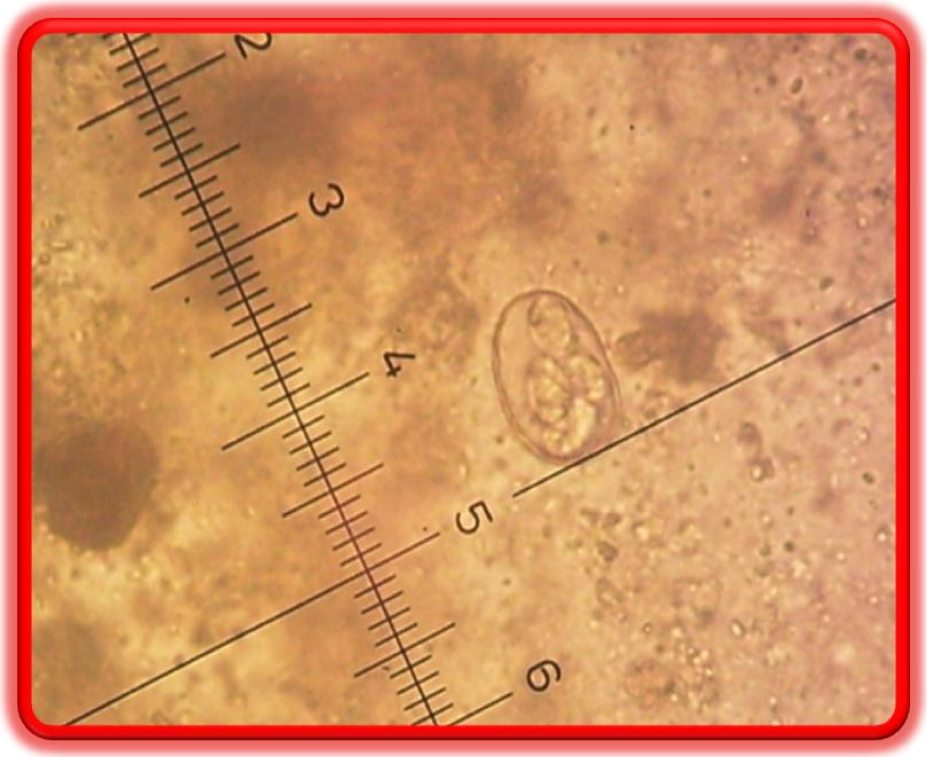

**Figure 3:***Eimeria bateri* oocyst by using direct.smear method.x400.

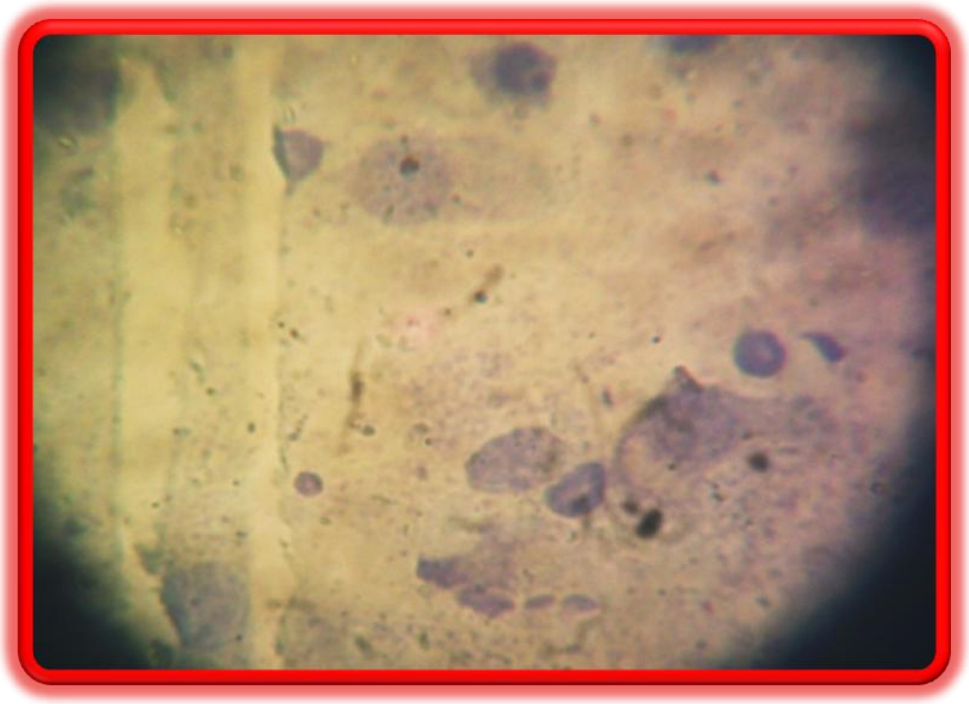

**Figure 4:** Caecum of quails showing presence of development stage of *Eimeria* spp in scrapling stained with Gimsas stain, 1000X.

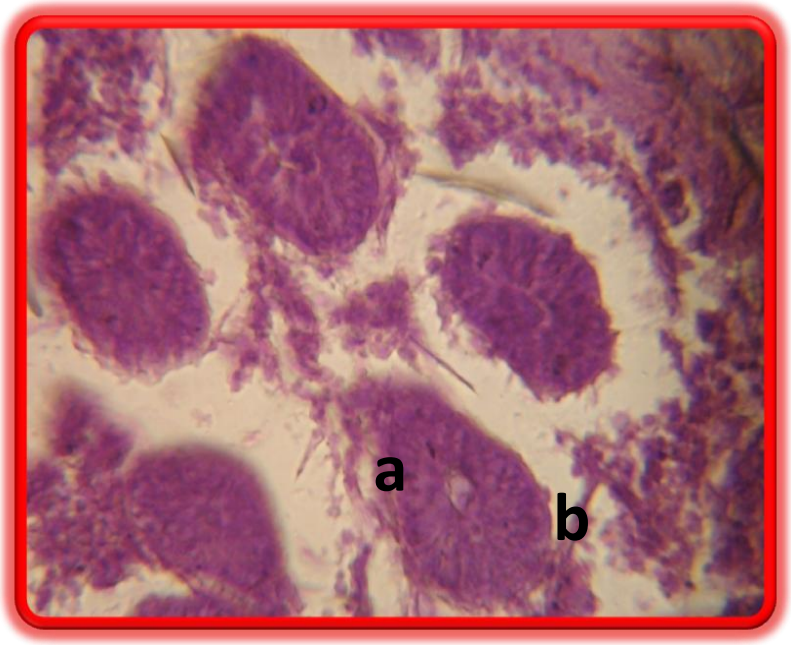


**Figure 5:**Histological section of small intestine showing hyperplasia of epithelial cells (a), with construction intestinal gland cavities (b). H&E X370.

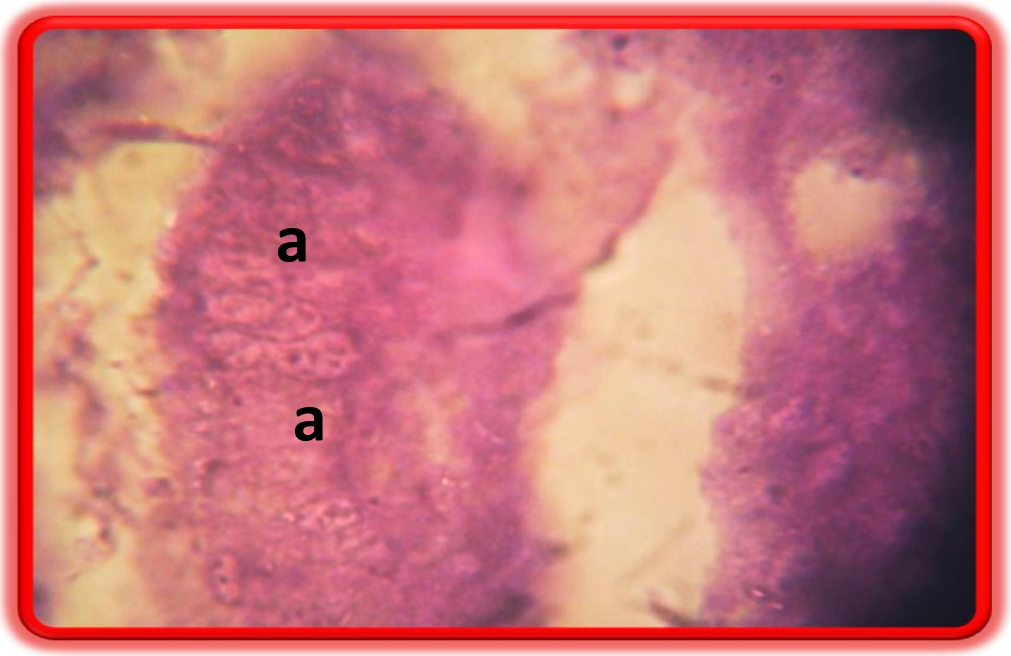


**Figure 6:** Histological section of small intestine showing presence of development stage of *Eimeria* spp .in the epithelial cells (a).H&E X370.

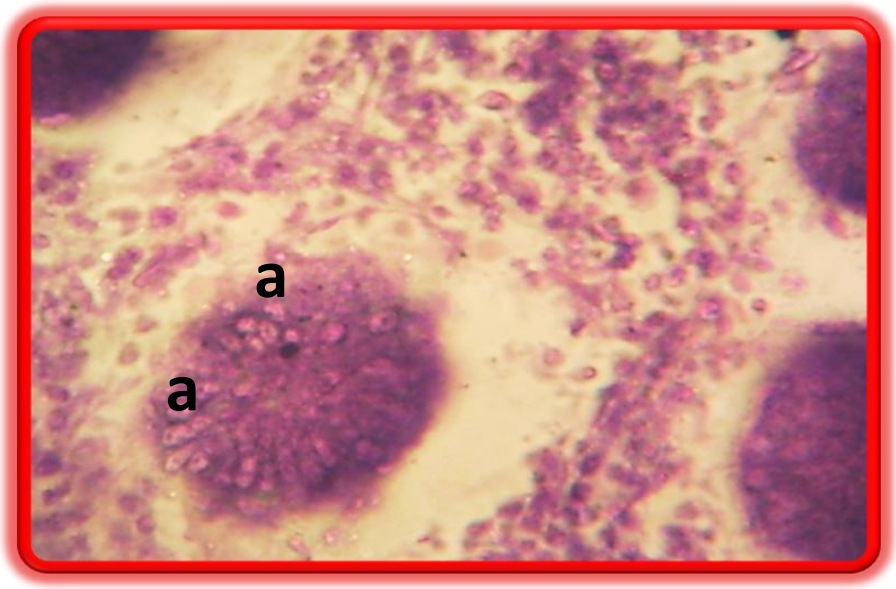


**Figure 7:** Histological section of small intestine showing presence of *Eimeria* spp.in various stages of development in epithelial cells (a), H&EX370.

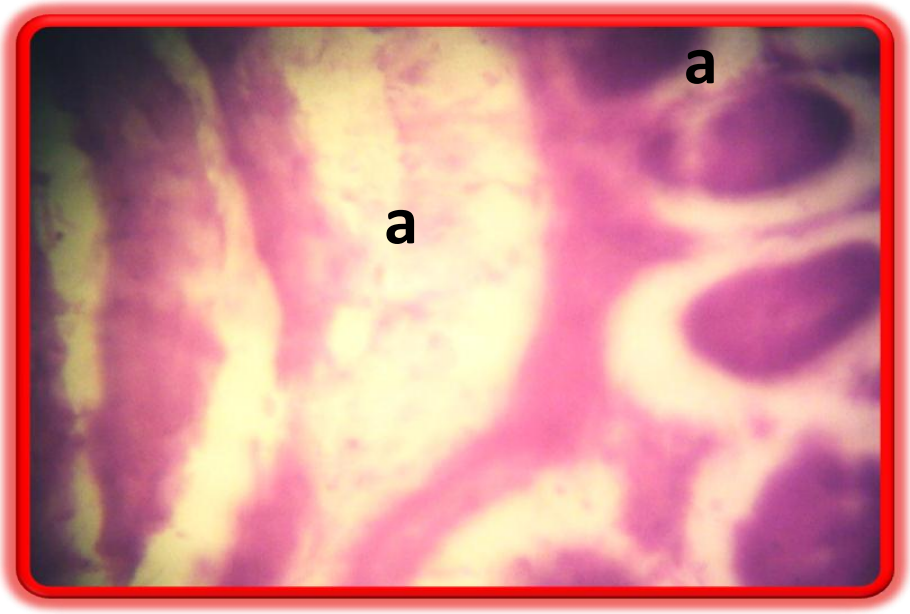


**Figure 8:**Histological section of caecum showing odema between the muscle fibers (a). H&E X370.

## DISCUSSION

Quails considered abranch of the modern poultry industry in Iraq. Several *Eimeria* spp are highly pathogenic to their host causing great economic losses in quail breeding and limiting development of this industry (19). The present study described the incidence,morphological and pathological characters of infection with *Eimeria* spin slaughtered Japanese*quails* examined fecal samples collected from intestinal tract revealed that 43(49.4%) were infected with *Eimeria* spp. This result is apparently similar to that obtained by(20) who detected *Eimeria* infection inAzerbaijan 52% of examined Japanese quails. But lower than study in the Okanagan valley of BritishColumbia(21)and higher than study in SaudiArabian(13) the difference in the percentage of infection in many studies may be related to different factors such as,environmental conditions,seasonal fluctuations, type of anticoccidial drugs may

have contributed to this difference(22). In this study three *Eimeria* were diagnosed naturally infected Jap*anese*quails(*Eimeria tsunodai,Eimeria bateri,Eimeria uzura*). These results are in agreement with reportsof 6,13. The measurement oocysts and sporocysts which observed in this study are in agreement with those described by (4,6,13,and 23). There was significant with different in prevalence between species of *Eimeria.*This might be due to immunity status of the host,stress factor,environmental conditions and misuse of coccidiostats or the development of local strain of *Eimeria* sppto variable compounds(24), the infection of *Eimeria* spp in intestinal tract showed that no asignificant differences *between* the infection of duodenum ,small intestine. While significant was noticed between the infection of caecum and the duodenum ,small intestine the cause of this difference might be due to high prevalence rate of *E.tsunodai* appeared in caecum(7)refers to the pathogenic of this species of *Eimeria* ismore effect than other species and expressed the pathogenic and clinical symptoms of *Eimeria tsunodai* resemble to those of chickens infected with*E .tenella*, the intensity of infection with *Eimeria* of Japanese quails revealed that high degree of infection appeared in caecum the result was in agreement with (15,25). According to the age,sex the infection rate of *Eimeria*sp was low in adult while it was high in young quails.These results not agreement withstudies carried out on quails in California(21) noted that the prevalence of coccidiosisincreased with the age of quails. While agreement with (26)reported that young birds are more susceptible to coccidiosis effects and it is suggested that older birds evidentially develop some kind of immunity to infection. On other hand no significant occurred in the incidence of infection between the male and female this result agreement with experiences of (21). The mixed infection with three species of*Eimeria* recorded the highest rates this result is in agreement with experiences of (22). While not agreement with (27)there was

asignificant differences was noticed between mixed infections, double and single infection .this might be due to many different factors such as farm management practices,oocyst contamination of food and drinking water,differences in management of the anticoccidial programs (28). The histopathological changes observed in duodenum,small intestine,caecum were more or less similar to those reported in quails by(5,6,7,29). The histopathological changes in intestinal tract pointed to the serious effect of *Eimeria*sp .in quails. This observation has an important value since the pathogenicity of *Eimeria* spp in quails had not been discussed.

## ACKNOWLEDGEMENT

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## دراسة تشخيصيه وإمراضية للاصابة بانواع طفيلي *EIMERIA* في طائر السمان الياباني

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### الخلاصة

تضمنت الدراسة الكشف عن انواع الاكريات المعوية لـ 87من طائر السمان الياباني تم الحصول عليها من مختلف مناطق محافظة نينوى.اشارت الدراسة الحالية الى ان نسبة الخمج الكليه بداء الاكريات 49.4% وتم تشخيص ثلاثة انواع من *Eimeria*وهي *E.tsunoda* 44.8%،*E.uzura* 34.5%و*E.bateri* 24.1% .وبينت الدراسة ان اعلى نسبة خمج كانت في الفئه العمرية الصغيرة.ولم يلاحظ وجود فرق معنوي في نسبه الخمج بين الجنسين.ولوحظ ان اعلى نسبة خمج وشدتة سجلت في الاعور.ان خمج طائر السمان الياباني بثلاثة انواع من الايميريا هو النمط الاكثر شيوعا وبنسبة 46.5%.اظهرت نتائج الدراسة الحالية وجود تغيرات مرضية عيانية تمثلت بوجود تلين البراز في كل من الاثني عشروالامعاء الدقيقة وكاناكثر وضوحا في الاعور مع وجود تثخن في بطانة الامعاء فضلا عن النزف الخفيف في الاعور.واظهر الفحص النسجي وجود تغيرات مرضية

تمثلت بفرط التنسج في ظهارة الامعاء والاعور مع وجود الوذمة بين الالياف العضلية مع المراحل التطورية للطفيلي وارتشاح للخلايا الالتهابية.وتعتبر الدراسة الاولى من نوعها في الكشف عن انواع الاكريات وتأثيرها المرضي في طائر السمان الياباني في محافظة نينوى.

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