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CRYPTOSPORIDIASIS IN COMMERCIAL CHICKENS

(With One Table and One Fig.)

By

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الإصابة بالكربتوسبوريديم فى الدجاج النامى ودجاج اللحم والبيض

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تم جمع عدد ٨٣٠ عينة من محتويات أمعاء الدجاج النامى ودجاج اللحم والبيض (٣٠٠ من الدجاج البلدى و٥٣٠ من سلالات الدجاج الأجنبى) من محلات بيع الطيور الاجنة بمناطق مدينة الأسماعيلية وتم فحصهم لمعرفة مدى الاصابة بالكربتوسبوريديم فى الدجاج. وتبين من الفحص الميكروسكوبى لمحتويات الأمعاء: أن نسبة الأصابة الأجمالية بحويصلات الكربتوسبوريديم فى الدجاج كانت ٩٦و١٠٪ ونسبة اصابة دجاج اللحم (بدارى التسمين) أعمارها من ٤٥-٦٠ يوم (٦ر١٧٪) أعلى عما كانت فى الدجاج النامى البلدى عمر ٣-٤ شهور (٥ر٨٪) مع الرغم أن الأختلاف كان غير معنوى بين نسبة الأصابة بحويصلات الكربتوسبوريديم فى دجاج البيض البلدى (٤٪) وسلالات البيض الأجنبى (٢٪) ، وعامة كانت نسبة الأصابة فى سلالات الدجاج الأجنبى (٢ر١٣٪) أعلى عما كانت فى الدجاج البلدى (٧٪) وبالفحص الهستوباثولوجى للأمعاء المصابة بحويصلات الكربتوسبوريديم وجد أطوار مختلفة من طفيل الكربتوسبوريديم بالأمعاء الدقيقة للدجاج المصاب وأتضح أن الأصابة بالكربتوسيوريديم كانت أكثر إنتشارا فى مجموعات قطعان التربية والأعمار الصغيرة عما فى أعمار الطيور الكبيرة. إن الطيور المصابة بالكربتوسبوريديم ربما لها دور فى انتشار وتواجد هذا الطفيل فى البيئة وما له من علاقة بالصحة العامة.

SUMMARY

In a survey for Cryptosporidial infection among commercial native and foreign breed chickens of different poultry markets in Ismailia city, the overall prevalence of Cryptosporidium sp. oocysts among the examined commercial chickens was 10.96%. The prevalence of Cryptosporidial infection in foreign fattening broilers aged 45-60 days (17.6%) was significantly higher than that reported among native semi-mature chickens aged 3-4 months (8.5%). However, there was no significant difference between Cryptosporidial positive rate of native layers (4%) and that obtained among foreign layers (2%). In general Cryptosporidial infection positive rate of commercial foreign breed chickens (13.2%) was significantly higher than that recorded among commercial native

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breed ones (7%). Histological examination of the infected chicken intestines confirmed various stages of Cryptosporidium sp. attached to the epithelial cells of the small intestines. Current research indicates that intestinal Cryptosporidial infection occurs on a flock or premises and is more likely to occur in younger birds than older birds. These findings have considerable epidemiological and public health significance for the investigated area.

Keywords: *Cryptosporidiasis, commercial chickens*

INTRODUCTION

Cryptosporidium spp. are coccidian parasites that inhabit the microvillous border of a variety of epithelial surfaces of human beings, wild and domestic animals, poultry, fish and reptiles *(LEVINE, 1984).*

Cryptosporidia have been associated with naturally occurring respiratory and enteric diseases and have been shown experimentally to produce disease in several avian species (BERMUDEZ, et al. 1988). Intestinal Crytposporidiosis has been associated with sever enteritis and high mortality in naturally infected bob white quail *(HOERR, et al. 1986).* Cryptosporidial infections of the intestinal tract have been reported in chicken *(RANDALL, 1982; ITAKURA, et al. 1984; CURRENT, et al. 1986 and LINDSAY, et al. 1986).* More recent experiments indicate that the isolates from calves, humans, deer, goats and lambs readily infect other species such as mice, rats, guinea pigs, chickens and foals without causing illness *(TZIPORI, et al., 1980; REESE, et al., 1982 and SHERWOOD, et al. 1982).* Mammalian isolates of this parasite readily infect other hosts including humans, indicating a lack of host specificity and zoonotic potential *TZIPORI, 1983).* There is little information on the prevalence of intestinal cryptosporidiosis for avian species whether commercial or non commercial. Therefore, this study was undertaken to determine the true prevalence of Cryptosporidium sp. infection in commercial chickens and also to screen for potential risk factors that may be associated with Cryptosporidium infection.

MATERIAL and METHODS

Sampling:

Between the period from October 1993 to June, 1994 a total of 830 chickens intestinal contents were collected from the slaughtered commercial native and foreign breed chickens of various purposes; 300 natve chickens (200 semimature chickens aged 3-4 months and 100 layers) and 530 foreign chickens (380 fattening broilers aged 45-60 days and 150 layers). All thesespecimens were collected from different poultry markets in Ismailia city.

Examination For Cryptosporidium Oocysts:

The chickens intestinal contents were processed by sugar flotation within few hours of collection, in the Dept. of Avian and Aquatic medicine, Faculty of Veterinary Medicine, Suez Canal University. One drop of fluid from the levitation suspension (meniscus) was deposited on a glass slide, cover glassed and examined microscopically at 400x. The levitation suspension was also examined for the detection of Cryptosporidium sp. oocysts by iodine wet mount (*MA and SOAVE, 1983)* as confirmatory test.

Histopathological Examination:

Fresh intestinal portions were taken from the only available 25 of 67 foreign fattening broiler intestines which had Cryptosporidium sp. oocysts.Fixed in 10% neutral buffered formalin and submitted for histologic processing (embedding in paraffin, staining with hematoxylin and eosin) and examined by light microscopy. Histopathologic diagnosis of intestinal Cryptosporidiosis was based on characteristic morphologic appearance and location of the parasites.

The analysis of data was achieved by chi-square (x^2) to evaluate whether or not association existed between the risk factors and identification of Cryptosporidium sp. oocysts.

RESULTS

The prevalence of Cryptosporidium oocysts among the examined intestinal contents of commercial chickens is summarized in table (1), the overall prevalence of Cryptosporidium oocysts of the commercial chickens was10.96%. In native breed chickens, the prevalence of Cryptosporidium infection of semimature chickens aged 3-4 months (8.5%) was higher than that obtained among layers (4%), however, statistically there was no significant difference (X^2=2.9, P>.05). In foreign breed chickens, Cryptosporidium oocysts positive rate was significantly higher among fattening broilers aged 45-60 days (17.6%) than that obtained of layers (2%) (X^2=22.96, P<.01).

Although, the prevalence of Cryptosporidial infection of foreign fattening broilers was significantly higher than that reported among native semimature chickens (X^2=8.8, P<.01). There was no significant difference between Cryptosporidial positive rate among native layers and that obtained among foreign layers (X^2=0.83,P>.05).

The distribution of Cryptosporidium infection in the different intestinal portions was histopathologically studied on the only available 25 foreign fattening broiler intestines which had Cryptosporidium sp. oocysts in its contents. Twenty three (92%) out of 25 infected intestines had various stages of Cryptosporidia colonized

the microvillous borders in its different predilection sites. Crtptosporidia as a numerous round to oval basophilic bodies; 2 to 4µm in diameter were found in the apical portions of enterocytes of the middle and lower portion of the chickens small intestines (Fig. 1). Cryptosporidium was not observed in theduodenum, cecum and colon of the histopathologically examined intestines.

DISCUSSION

Cryptosporidium sp.are unique among coccidia of vertebrates because of their endogenous development on the microvillous border of epithelial cells(i.e. intracellular but extracytoplasmic), lack of host specificity and their ability to infect various tissues *(DHILLON, et al. 1981 and CURRENT, 1984)*. Recent attention given to Crytosporidium sp. infection in otherwise healthy *(WOLFSON, et al. 1885)* or immunodeficient *(SOAVE, et al. 1984)* persons with diarrhea has brought about increased awareness of the probable role of Cryptosporidium as a pathogen in birds. In the present study; the overall prevalence of Cryptosporidium sp. oocysts among the examined commercial chickens (10.96%) was nearly similar to that reported by *BADAWY (1989)*. Who found that the overall incidence of Cryptosporidium sp. oocysts of chickens was 12.5% in Egypt. Cryptosporidial infection was more prevalent in foreign breed fattening broilers aged 45-60 days this was nearly similar with that obtained by *RANDALL (1982)* who found infection in 18.7% of broilers aged 4-7 weeks. On the other hand, low incidence of infection (6.6% and 6.4%) was recorded by *GORHAM, et al. (1987) and GOODWIN and BROWN (1988)* in chicken aged 21-30 days and 14-51 days respectively. A higher rate of infections was reported by *SNYDER, et al. (1988)* in chickens aged 49 (38%) and 63 days (50%). Cryptosporidium sp. occysts positive rate recorded among the foreign breed layers (2%), in this work was a relatively similar to that recorded by *LEY, et al. (1988)*.

Our data indicated that the percentage of Cryptosporidial infection among native semimature chickens aged 3-4 months and layers was in greement with that reported by *BADAWY (1989)* who found Cryptosporidial infection in 9.1% in age group 3-9 months and 4.6% in age group 6-12 months.

According to the results of this work, our findings indicated that the prevalence of Cryptosporidial infection decreased with increased age of chickens. This confirms the results obtained by *DHILLON et al. (1981); GORGHAM et al. 1987; SNYDER et al. (1988) and Badawy (1989)*. The discrepancy between the obtained prevalence of Cryptosporidial infection among the examined chickens in the present study and

those of other authors may be due to several factors, such as breed, age, species, management and sanitary conditions of the examined birds and the method of diagnosis used.

Most infectious organisms have ecological niches that they prefer over all others. In humans and other animals *TZIPORI, 1983),* Cryptosporidium sp. most commonly are found in the middle portion of the small intestine. Histological examination of the affected intestines confirmed various stages of Cryptosporidium sp. attached to the epithelial cells of the intestines. The severity of infection in the cases reported in the present study ranged from light to severe *(PAPADOPOULOU et al., 1988).* Concerning the predilection site of infection in the naturally infected chicken intestines, the present study emphasized that the intestinal tissues most frequently affected with the parasite were the middle and lower portions of the small intestines. This is in agrement with that by *GOODWIN, et al. 1988 and LINDSAY et al. (1986)* who stated that Cryptosporidia was not observed in the duodenum, and cecum in the orally inoculated chickens. Moreover, *BADAWY (1989)* found no parasites in duodenum, jejunum and ceum of the naturally infected chickens of different age groups.

The result of the present investigation disagreed with that reported by *TYZZER (1929)* who stated that, the infection in chicken was confined to the tubular portion of the ceca. Comparison of these observations suggests that different avian Cryptosporidium species or strains, age and breed of the birds *BERMUDEZ et al. al., 1988 and BADAWY (1989)* may exhibit variations in tissue tropism in their hosts.

The obtained results, in this study, support the conclusion that intestinal Cryptosporidiosis occurs on a flock or premises basis and is more likely to occur in younger birds than older birds *(LEY et al. 1988).* In order to diagnose Cryptosporidiosis of the small intestine, the histology laboratory should receive clinical specimens from the middle and lower segments of the small intestine.

Cross-species infectivity studies suggest that Cryptosporidia are not host specific. Under experimental conditions calf isolates could infect the intestines of chickens *(TZIPORI et al., 1980).* Mammalian isolates of Cryptosporidium are transmissible to other species of mammals and Cryptosporidiosis is now recognized as a zoonoses *(TZIPORI, 1983).*

From the reported reviews and the present results, the Cryptosporidium sp. infections are more prevalent among chickens and it is suggested that chickens may play a role in maintenance and spread the infection in the environment. These findings have considerable epidemiological

and public health significance for this investigated area.

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Table (1): Prevalence of Cryptosporidium sp. oocysts among the examined intestinal contents of the commercial chickens

Breeds	Total No. of intestinal content specimens	Number of the chicken intestinal contents positive for Cryptosporidium sp. oocysts/total number of the examined chickens	
		+ve	%
Native breed			
Semimature chickens	200	17/200	8.5
Layers	100	4/100	4
Total	300	21/300	7
Foreign breed			
Fattening broilers	380	67/380	17.6
Layers	150	3/150	2
Total	530	70/530	13.2
Grand total	830	91/830	10.96

Fig. (1): Light photomicrograph of Cryptosporidium (arrow) parasitizing small intestinal absorptive epithelial cells, the lamina propria is infiltrated by mixed population of inflammatory cells (H & E x 400)