Ass. Univ. Bull. Environ. Res. Vol. 2 No. 2, October 1999

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HYGIENIC SURVEILLANCE OF CRYPTOSPORIDIOSIS IN DOGS (CANIS FAMILIARIS) AND CATS (FELIS CATTUS)

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ABSTRACT :

Cryptosporidium species are coccidian parasites with a large capacity to reproduce and to disseminate. The parasite has been implicated in outbreak of diarrhea in mammals, including animals and humans. Various aspect of *Cryptosporidium* infection was studied in 27 dogs (13 males and 14 females) and 59 cats (29 males and 30 females) captured from Aswan Governorate. The rectal contents were examined by sheather's – floatation technique. Oocysts of *Cryptosporidium* were detected in 3 dogs (2 males & 1 female) out of the 27 examined dogs (11%) and 12 cats (4 males & 8 females) out of total 59 examined cats (20%). The 3 positive dogs showed normal faeces and were 2-6 months in age. On the other hand, positive cats were aged 2-36 months. 25 (42%) of the examined cats showed diarrhea and 34 (58%) passed normal faeces (Asymptomatic). *Cryptosporidium* infection was observed in 4 of the former cats (with diarrhea) and 8 of the later were apparently normal (without diarrhea, Asymptomatic). Other parasites than *Cryptosporidium* were also detected including *Isospora felis*, *Toxocara cati, Spirometera erinacer*, *capillaria* sp. and *pharyngostomum cordatum*. No particular relationship was noted between *Cryptosporidium* infection and these parasites. The prevention strategies and recommended measures were discussed.

INTRODUCTION :

Cryptosporidiosis is an infectious disease caused by a coccidian parasite belonging to the genus *Cryptosporidium.* The increased recognition of the seriousness of cryptosporidiosis has aroused the concern of public health, medical, veterinary and research communities. The parasite is known to cause diarrheal and gastrointestinal illness in a wide variety of mammals including immunocompromised patients such as those

with AIDS or cancer and animals as cattle, sheep, goats, pigs and squirrels [1,2,3,4]. Cryptosporidisis is highly host species dependent. Cryptosporidial infection occurs world–wide and have been reported in a variety of reptiles and fish . Two species of *Cryptosporidium*; *C. muris* from the gastric glands and *C. parvum* from the small intestine of laboratory mice were described by Tyzzer [5]. Oocysts of the former species (measuring 7.0×5.0 μ m) are destrictly larger than those from the later measuring up to 4.5 μ m. Although the transmission and source of infection have not been well understood, the possible involvement of domestic and wild animals have been strongly suggested in transmission to humans [6].

***Rattus norvegicus* (brown rats) are wild animals that are common in both urban and cural environment have been strongly suggested in the transmission of Cryptosporidiosis to humans [6]. Previous epidemiological studies on cryptosporidiosis among house rats have been carried out in several areas in Japan and have showing high incidence of *Cryptosporidium* infection [7,8]. In Egypt an epidemiological study among house rats was performed by Abdel-Maksoud [9]. Moreover Cryptosporidiosis has been reported in Egypt in case of human beings as well as different species of animals [10].**

Although the role of cryptosporidia as a cause of enteritis in farm animals and man, it has only been the subject of much recent interest [1,11-16]. Little is known about the disease in companion animals. The incidence of *Cryptosporidium* infection in cats is unknown but Cryptosporidiosis might be included in the differential diagnosis of chronic feline diarrhea. The possible zoonotic implications should also be borne in mind [15]. Cryptosporidiosis in calves and lambs is often associated with other enteric pathogens, although outbreaks of diarrhea have occurred from which only Cryptosporida were isolated [1]. The source of human Cryptosporidiosis is often not known, but person-to-person and cattle-to-man transmission can occur [12,17]. Younger children are at increased risk fro exposure to *Cryptosporidium* infected dogs because they do not normally wash their hands after playing with dogs. Pups from unknown or questionable sources constitute a potential source of the parasite for the human population. It should be kept in mid however, that the risk is higher of contracting infection from human than from dogs. In a recent survey, only 2% of dogs passed infective forms of the parasite compared to 3% of people in the same geographic area [18].

Possible transmission from a cat to its owner has also been described [6]. Human and feline contacts recently had mild transient diarrhea but no Cryptosporidia were seen in their stools [15].

Furthermore, since *Cryptosporidium* infection is known to occur directly via the faeces of infected individuals or animals [19], information about the state of contamination with the protozoan among dogs and cats which are in close contact with humans, is considered to be essential in evaluating

dynamics of human Cryptosporidiosis.

On account of the importance of Cryptosporidiosis in man and animals , the present work was designed to study the prevalence of cryptosporidia and epidemiology of Cryptosporidiosis in dogs and cats in Aswan Governorate, Egypt.

MATERIAL AND METHODS :

The present study was conducted in 27 Dogs (13 males and 14 females) of variable ages ranged from about 2 months to 5 years, and 59 cats (29 males and 30 females) ranged from about 1 month to 4 years, were examined for *Cryptosporidium* and other parasitic infestation. The details of the method for detection of *Cryptosporidium Oocysts* were described previously [8,9,11,15, 20] and the details of examination of faeces and staining of helminthes was described by Abdel-Maksoud [9,22,23]. Briefly Sheather's sugar solution technique was performed , as 1 gm of faecal sample was suspended in 10 ml of 2% $K_2 Cr_2 O_7$, and filtered through gauze. The filtrate was centrifuged at 650 r.p.m. for 10 min. and the supernatant was discarded. A sucrose solution with sp.g. of 1.200 was added to the sediment, mixed thoroughly, and centrifuged at 650 r.p.m. for 10 min. Oocysts floating on the surface were recovered using a bacteriological loop and observed under a phase contrast microscope at magnification of ×600 and *Oocysts* of *Cryptosporidium* were counted in 20 microscopic fields for each examined specimen .

RESULTS :

Oocysts were shown brightly under the phase contrast microscope and could be readily distinguished from other materials (Fig. 1). The Oocysts discharged from naturally infected dogs and cats contained four sporozoites and the residual bodies were observed as distinct black spots. Positive *Cryptosporidium* infection was observed in 3 dogs (11%) of a total 27 and 12 in cats (20%) of total 59 examined animals and with a higher percent in cats than in dogs.

Infection in dogs:

Table (1) showed the data concerning the 3 positive dogs of total 27 that their faecal matter were containing Oocysts of four sporozoites. No particular characteristics were observed in the place of animal capture, sex, or body weight of the dogs. Out of 27 dogs examined, 8 were considered to be of 2-6 months of estimated ages and 3 of 8 were positive. On the contrary, 19 dogs were estimated to be more than 6 months of age and all of them were negative for presence of Cryptosporidium Oocysts . The faeces of 3 positive dogs (1 male & 2 females) were considered to be normal.

Fig. (1)*: Cryptosporidium* Oocysts recovered from cat stool (No. 5 in table 2) by Sheather's sugar floatation .
Sp : Sporozoites **OW: Oocyst wall** **V : Vacule (residuum)**
AM: Amylopectine **L : Lipoprotein** **RB: Residual body**

Table (1):*Cryptosporidium* and other parasites found in dogs in Aswan Governorate, Egypt.

No. of Positive Dog	Region	Dogs			Faeces	No. of Oocysts (*)	Other parasite
		sex	Weight / Kg	Age/ M	N or D		
1	Hakaroub	Male	4.2	6.0	N	3.0	Toxocara canis
2	Gozaierah	Female	3.4	4.0	N	2.0	-
3	Hasaya	Male	1.7	2.0	N	7.0	-

(*) : Number of *Cryptosporidium* Oocysts in 20 fields.
In order of sex (Male or Female) & Animal age/ month(M)
N : Normal
D : Diarrhea
Total of examined dogs = 27
Number of positive dogs = 3.0
Number of negative dogs = 24

Infection in cats :

Twelve cats of total 59 were shown to be positive for *Cryptosporidium* infection during this investigation (Table 2). The infected cats consisted of 4 males and 8 females. Concerning the relationship between the age and the positive percentages, 5 cats (8.5%) aged 3 months or less, of no milk teeth have been replaced with permanent teeth and 7 (11.9%) aged one year or more (abrasion of incisors having begun) were positive for *Cryptosporidium* infection. From all positive examined 12 cats (20.3%), only 4 cats (6.8%) showed Diarrhea.

Table (2): *Cryptosporidium* and other parasites found in cats, Aswan Governorate, Egypt.

No. of Positive Cats	Region	Cats			Faeces	No. of	Other parasite
		sex	Weight / Kg	Age / M	N or D	0ocyst (*)	detected
1	Hasaya	M	0.5	2.0	D	64	S.e
2	Hasaya	F	2.0	12	N	450	S.e
3	Hasaya	M	0.5	3.0	D	120	S.e
4	Hasaya	M	3.0	24	N	4.0	P.c
5	Hasaya	F	0.5	3.0	D	22	I.f
6	Hakaroub	F	1.2	3.0	D	110	T.c
7	Hakaroub	F	0.9	2.0	N	79	T.c
8	Gozirah	M	3.5	36	N	542	C.sp
9	Gozirah	F	4.2	36	N	4.0	C.sp
10	Gozirah	F	2.0	12	N	5.2	I.f
11	Gozirah	F	2.5	18	N	1.0	T.c
12	Gozirah	F	1.9	12	N	316	T.c

(*) : Number of *Cryptosporidium* Oocysts in 20 fields.
In order of sex (Male or Female) & Animal age/ month(M)
N : Normal D: Diarrhea
S. e : *Spirometera erinacei* T. c : *Toxocara cati*
C. sp *: capillaria sp.* P. c : *Pharyngostomum cordatum*
I.f*: Isspora felis*
Total of examined cats = 59
Number of positive cats = 12
Number of negative cats = 47

DISCUSSION :

Reports concerning *Cryptosporidium* have increased rapidly since 1980, and epidemiological studies of human cryptosporidiosis have been carried out in various regions of the world. Fayer and Ungar [24] reviewed that prevalence rates in Europe and North America were most often reported as 1-2% and 0.6-4.3%, respectively. In contrast, prevalence rats in Asia, Australia and Africa were 3-20%. They concluded that *Cryptosporidium* was associated in all area of the world but was most prevalent in the less developed regions. The infection is reported to be more frequent in children than in adults, particularly the young children [24]. Of 697 children with gastroenteritis 4.7%

were positive for *Cryptosporidium*, but only 1.6% in 187 adults [25]. Nearly 20 separate species have been reported in the genus *Cryptosporidium* , but these species are still under evaluation. Iseki [7] observed the species with larger *Ooceyst* (7.8 ×5.6 μ m) in the *Rattus norvegicus.* Abedel-maksoud [9] found a new strain from Egypt (8.5–9.0× 5.5–7.8 μ m). The large forms of *Oocyst* has been detected in mice, rats, and cattle, but was not observed in dogs and cats in the present study.

The obtained results of this investigation revealed that, the percentage of *Cryptosporidium* infection was 11% in dogs and 20% in examined cats. It is most likely that the infection is strongly affected by breeding condition of the cat. Concerning the relationship between age and infection, seven of the infected cats were adults and aged one year or more unlike, the results in humans [25]. Diarrhea is considered to be the most prominent symptom in human and other domestic animals [25-28]. Mikhail [29] recorded *Cryptosporidium* infection in man in Aswan, Egypt(9%), while Salem [10] found a percentage of 7.3% in human beings in Giza, Egypt. The variation in the infection may be a function of several factors such as the frequency of contact with animals [30] and lack of personal immunity [31]. Moreover the apparent lack of host specificity complicates the epidemiology of this parasite. The role of the domesticated livestock in the transmission of parasite to human and other mammalian species has been suggested and may serve as potential reservoir for this zoonotic parasite. In this study however, no relationship was observed between *Cryptosporidium* infection and diarrhea. Although the number of Oocysts detected to be massive in cats that showing diarrhea, but it is not absolutely confirm whether they had diarrhea because of the sever infection with *Cryptosporidium Oocysts* or the infection was severe because of the diarrhea from other source. Koch [19] reported no clinical illness in the infected cat where faeces were sometimes with foul smelling and soft. Furthermore, as observed in this study, the epidemiological profiles of dogs and cats with *Cryptosporidium* infection were different from that of humans. It may be concluded that *Cryptosporidium* is one of the causative disease agent in dogs and cats. These animals should be regarded as potential reservoirs of infection for other animals and human.

The transmission of the disease can occur from infected animals, human, person to person, animal to man and contaminated soil. Pet animals can play an important role in the epidemiology of Cryptosporidiosis. Mammalian isolates of this parasite readily infect other hosts including human, that indicating a lack of host specificity and its zoonotic potential [2]. In calves and human the *Cryptosporidium* infection is primarily transmitted by the faecal-oral route. The infection typically begins when a susceptible individual ingests water or food contaminated with Oocysts(eggs) of this parasite. The parasite then invades the epithelium of the intestine, replicates through sequential reproductive cycles, then shedding of Oocysts

daily in faeces. In, clinical disease and shedding of the parasite is usually limited to calves under a few months of age, but there are a few reports of subclinical shedding in adult cattle. In humans, clinical disease and shedding appears to occur at all ages, but is most common among children. The predominant clinical signs is profuse, watery diarrhea lasting up to several weeks in normal (immunocompetent) calves and humans. the disease is usually self-limiting in immunocompetent calves and man, but it can be prolonged and become life-threatening among immunocompromised patients since an effective treatment for eliminating this parasite from the gastrointestinal tract still does not exist [4].

Cryptosporidiosis may be of the worst opportunistic infections. *Cryptosporidium* is now thought to be one of the third most common enteropathogens causing diarrheal illness found worldwide, with a prevalence in stool specimens ranging from 1% to 30% as a cause of acute diarrhea [16,24]. In the absence of effective therapy for Crypto-sporidiosis a preventative approach and strict hygiene must be taken. There is no proven specific treatment for Cryptosporidiosis [32]. The resistance of Cryptosporidium Oocysts to disinfectants can make the control of its spread difficult [33], so the proper hygiene and strict clean of housing of animals can reduce the prevalence of *Cryptosporidium* Also a clean environment can help to minimize the possibility of *Cryptosporidium* infection among mammals. Moreover, it is important to limit the migration of Cryptosporidium Oocysts through the environment from infected animals by regularly and properly disposing of faecal excreta. Furthermore avoid run-off of faecal droppings into different water sources, is of general recommendation should include good personal hygiene and public health at all times in form of careful hand washing with warm soapy water, dispose of animal faeces promptly and properly, isolation of infected animals, treatment of diseased animals particularly those with diarrhea and finally clean and disinfect contaminated equipment and surrounding environment, as well as the hygienic measures and good management of farm and pet animals.

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Ass. Univ. Bull. Environ. Res. Vol. 2 No. 2, October 1999

المسح الصحى لتقييم الإصابة بطفيل الكربتوسبوريديم فى الكلاب والقطط

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الملخص :

أجريت هذه الدراسة للوقوف على الحالة الصحية لكل من الكلاب والقطط ومدى فاعلية دورها فى حمل ونقل الإصابة بطفيل الكربتوسبوريديم فى محافظه أسوان ، وذلك بالاستعانة بالفحص المجهرى لعينات براز مأخوذة من عدد ٢٧ كلب ، ٥٩ قطة ، وذلك باستخدام طريقة شيذر لتعويم حويصلات طفيليات الكربتوسبوريديا ، وقد أسفرت نتائج الفحوص عن وجود عدد ٣ كلاب (٢ ذكور ، ١ أنثى) بنسبة ١١% (تراوحت أعمارها من ٢–٦ شهور) ، وكذلك عدد ١٢ قطة (٤ ذكور ، ٨ إناث) بنسبه ٢٠% (تراوحت أعمارها من ٢–٣٦ شهرا) ، كانت إيجابية لوجود حويصلات طفيل الكربتوسبوريديا ، وذلك من إجمالى عينات براز الحيوانات المفحوصة . وقد لوحظ بأن كل عينات براز الكلاب الإيجابية نتيجة وجود حويصلات هذا الطفيل بدت طبيعية من حيث الفحص الظاهرى لها بينما أظهرت نتائج فحص براز القطط عن وجود عدد ٢٥ قطه (٤٢%) تعانى من ليونة أو إسهال لعينات البراز المفحوصة ، والتى تبين من فحصها وجود عدد ٤ قطط مصابة فعلاً بحويصلات طفيل الكربتوسبوريديا بينما لوحظت عينات ٣٤ قطة (٥٨%) ذات قوام طبيعى ، والتى تبين منها أيضاً أن عدد ٨ قطط كانت إيجابية الإصابة بهذا الطفيل. ، وقد تم أثناء هذه الدراسة الكشف عن وجود عدد آخر من بعض الطفيليات فى بعض عينات البراز المفحوصة شملت الأيزوسبورا ، التكسوكارا ، الإسبيرومترا ، كابيلاريا ، وكذلك الفرينجوستومم . وقد أظهرت نتائج هذا البحث عن عدم وجود ثم علاقة ارتباط خاصة عن مدى إيجابية تواجد الإصابة بطفيل الكربتوسبوريديم من عدمه ، وذلك فى حاله الإصابة بالطفيليات سالفة الذكر.

وتعتبر مثل هذه الحيوانات المصابة بطفيل الكربتوسبوريديم ذات دور فعال فى انتشار وإكثار هذا الطفيل فى البيئة المحيطة وبما له من مردود ضار وخطر على صحة الإنسان والحيوان.

ومن الجدير بالذكر أنه قد تم استعراض بعض التوصيات والإرشادات الصحية والتى من شأنها التخلص أو التقليل من الإصابة بطفيليات الكربتوسبوريديا فى بيئة كل من الإنسان والحيوان أملاً فى الوصول للمستوى الصحى الأفضل والمنشود.