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CRYPTOSPORIDIOSIS AMONG ANIMAL HANDLERS AND THEIR LIVESTOCK IN BASRAH, IRAQ
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CRYPTOSPORIDIOSIS AMONG ANIMAL HANDLERS AND THEIR LIVESTOCK IN BASRAH, IRAQ

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ABSTRACT

***Objective*: To investigate the prevalence of cryptosporidiosis among groups at risk (animal handlers) and among domestic animals.**
***Design*: Comparative study with zoonotic aspect.**
***Method:* Stool samples were collected from 60 animal handlers, 175 nonanimal handlers and 198 domestic animals (60 cows, 45 sheep, 45 goats, 25 horses and 23 camels). Direct smear method and then formalin-ether sedimentation method were carried out for stool samples to detect intestinal parasites. Faecal smears were prepared from the sediment and stained by the modified Ziehl-Neelsen method for the recovery of red-pink oocysts of *Cryptosporidium*.**
***Results*: Out of the 60 animal handlers, 30 (50%) were found to be positive for intestinal parasites compared to 26 (14.8%) of non-animal handlers ($P<0.01$). *Cryptosporidium* oocysts were found to be excreted by three (5%) animal handlers and two (1.14%) of the non-animal handlers ($P>0.05$). Cryptosporidiosis was also diagnosed in 20%, 13.3%, 17.7% and 12% of cattle, sheep, goats and horses respectively. No single positive case was detected among the examined camels.**
***Conclusion*: Veterinarians, butchers and breeders should be aware of the disease among farm animals in order to avoid great losses and to prevent its transmission to humans.**

INTRODUCTION

Cryptosporidiosis is an emerging, zoonotic disease which produce intestinal and extra-intestinal disorders in both humans and animals. The disease is well known in veterinary medicine and only recently has it been recognised as a leading protozoal cause of diarrhoea in humans(1).

Faeco-oral transmission between domestic animals and humans may be an important mode of infection and it is likely that both serve as reservoirs of the disease(2). People at risk are animal handlers and also children attending day care centres, patients on immunosuppressive therapy and patients with chronic diseases(3).

Cryptosporidium causes severe, watery diarrhoea, anorexia and weight loss in economically important animals especially neonates(3). The animal either resist the infection or die after becoming infected(3,4). Human species, *C. parvum* has been identified as the most common infectious agent in outbreaks of diarrhoea in USA among cattle, sheep, goats and pigs(5). A report in 1985, suggests that only *C. parvum* and *C. muris* infect mammals while *C. meleagridis* infect just birds(3). Animal-to-human as well as human-to-animal transmission of *Cryptosporidium* has been observed. However, avian cryptosporidiosis is presumed not to be a zoonotic threat to humans.

The parasite can easily be transmitted from one mammalian species to another, and the wide distribution of the parasite in ruminants causes contamination of surface and ground water(6). Contaminated drinking water was reported as a source of human infection with cryptosporidiosis(7). The possible air-borne infection has been established by Giang *et. al.*(8). Many accidental infections can occur among researchers or labolatory workers during handling of infected samples or laboratory animals(9).

A clear association between bovine and human cryptosporidiosis was established in 26 subjects who had direct contact with the stool of infected calves(10). It has been suggested that sheep are reservoir for endemic cryptosporidiosis in the United Kingdom(11). Seropositivity rates of 44% among dairy farmers and 24% among persons who had never worked on a farm in Wisconsin, USA were found(12). In the middle of Iraq, the disease was studied just among calves(13,14) and there is no other study among domestic animals including camels and their handlers. In addition, there has been no attempt to determine the susceptibility of camels to infection across the world.

MATERIALS AND METHODS

Human subjects: The study was comprised of 60 subjects who had been in contact with the domestic animals (veterinarians, butchers and breeders). Their ages ranged from 4-62 years (mean 27-16±16.86 years). There were 37 males and 23 females. Also 175 apparently healthy individuals (105 males and 70 females) who had no contact with animals and had no episodes of diarrhoea for the last two months were studied as a control. Their mean ages was 23.7±20.1 years.

Animals: One hundred and ninety eight stool samples were collected from five species of domestic animals (60 cattles, 45 sheep, 45 goats, 25 horses and 23 camels). The criteria for their inclusion was, their contact with persons included in this study.

Stool samples: Single stool samples were collected and processed for the detection of ova, trophozoite or cyst stages of intestinal parasites. Direct smear method and then Ritchie formalin-ether sedimentation concentration method(15) were carried out for all stool samples to detect the non-acid fast parasites. Faecal smears were prepared from the sediment and stained by the modified Ziehl-Neelsen method(15) for the identification of red-pink oocysts of acid-fast parasites.

Statistical analysis: The Standard Normal Deviate (SND) test was used as a test of significance. Differences were recorded as significant wherever the probability(p) was less than 0.05.

RESULTS

Out of the 60 examined animal handlers, three (5%) were found to excrete *Cryptosporidium* oocysts. In comparison two (1.14%) of the non-animal handlers were found to excrete the oocysts (SND= 1.85; P>0.05) (Table 1). Out of the 60 animal handlers 30 (50%) were found to be positive for intestinal parasites (including *Cryptosporidium*), while 26 (14.8%) of the non-animal handlers had intestinal parasites (SND= 8.58 ; P<0.01) (Table 2). The infected comprised of 20 male and 10 female animal handlers. The most common parasites were *Blastocystis hominis* (43.3%) and *Enterobius vermicularis* (20%) among the positive animal handlers. Of 175 non-animal handlers examined in this study, 14.8% were found to be infected with one or more intestinal parasites (Table 2).

The rate of *Cryptosporidium* infection in animals is shown in Table 3. A higher rate of infection was found among cattle (20%), while the lowest was found among horses (12%). There were no positive cases among the examined camels. The overall rate of infection among the studied animals was 13.6% (27/198).

Table 1

Distribution of positive Cryptosporidium infection among animal and non-animal handlers

Age (years)	Animal handlers		Non-animal handlers	
	No. examined	No. infected (%)	No. examined	No. infected (%)
<6	8	2(25.0)	60	1(1.66)
6-15	11	0	20	0
16-25	9	1 (11.11)	20	0
26-35	11	0	17	0
36-45	11	0	25	0
46-55	8	0	18	0
56-65	2	0	15	1(6.66)
Total	60	3(5.0)* *	175	2(1.14)*

SND = 1.85; P > 0.05

** *C. muris*

* *C. parvum*

Table 2

Distribution of parasitic infections including Cryptosporidium among animal and non-animal handlers in relation to sex

Parasite	Animal handlers (n = 60)			Non-animal handlers (n = 175)		
	Male	Female	Total	Male	Female	Total
Single						
Cryptosporidium	2	-	2	-	-	-
B. hominis	8	5	13	9	2	11
G. lamblia	4	-	4	3	0	3
E. histolytica	-	1	1	1	1	2
E. vermicularis	4	2	6	2	4	6
Trichuris trichiura	-	1	1	-	-	-
Ascaris lumbricoides	1	-	1	-	-	-
Hymenolepis nana	1	-	1	-	-	-
Mixed .						
Cryptosporidium + *B.* hominis	-	-	-	1	1	2
Cryptosporidium + *G. lamblia*	-	1	1	-	-	-
B. hominis + *G. lamblia*	-	-	-	1		1
B. hominis + *E. vermicularis*	-	-	-	-	1	1
Total	20 (33.3)	10 (16.7)	30 (50.0)	17 (5.1)	9 (9.7)	26 (14.8)

SND = 8.58; P<0.01

Table 3

Cryptosporidium muris among five species of domestic animals

Animal species	No. Examined	No. Positive (%)
Cattle	[illegible]	12(20.0)
Goats	45	6(13.3)
Sheep	45	8(17.7)
Horses	25	3(12.0)
Camels	23	2(0.0)
Total	198	29(13.6)

DISCUSSION

The prevalence of cryptosporidiosis in human is lower than that in animals. In comparison, animal handlers had a higher prevalence than non-animal handlers. The prevalence of human infection though low is of value from the public health point of view, it would be higher if more than one stool sample from each person was examined due to the irregular shedding of acid-fast oocytes(16) and *Giardia lamblia*(17). This rate is also lower than that of animal handlers examined for cryptosporidiosis in Bangladesh(18) and in Guinea-Bissau(19). Although high percentage of infection (25%) was found among children less than six years old, no significance was found between age groups. This high percentage may assign the cause that, children are in continuous contact with animals and their faeces make them more exposed to the infection, while the lower rate of infection observed among the more aged people can be attributed to their acquired immunity.

The prevalence of cryptosporidiosis among five domestic animals involved in the study was 13.63%. Twenty percent for cattle is lower than that reported in the middle of Iraq (33.37%, 39.8%)(13,14). The higher infection rates recorded in cattle may be due to the inclusion of diarrhoeal neonatal calves which normally have a higher prevalence rate than older cattle(10,20). The prevalence rate among goats in this study was lower than that reported in Australia (85%) among diarrhoeal kids(21) . Also, the prevalence among sheep was lower (85%) than that observed in lambs by Angus *et. al.*(22). Horses were examined serologically by Tzipori and Campell(23) and 91% were shown to have antibodies against *Cryptosporidium*. No single positive case was discovered among the examined camels. However, this was the first attempt on camels and needs further investigations.

In conclusion, veterinarians, butchers and breeders should be aware of the disease among farm animals in order to avoid great losses and to prevent its transmission to humans.

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