Prevalence of *Echinococcus granulosus* in Stray Dogs and Hydatidosis in Camels in Tambool Area, Gezira State, Sudan

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ملخص البحث

أجريت دراسة وبائية لمرض ديدان المتقوقسة الشوكية في منطقة تمبول ، شرق الجزيرة خلال الفحص الروتيني للحوم الإبل المذبوحة في السلخانة وكذلك خلال فحص براز الكلاب الضالة. كانت نتيجة المسح وجود الأكياس العدارية في 70 من الإبل (56.5%) من جملة 124 تم فحصها. بينما كانت نسبة الإصابة بالمتقوقسة الشوكية في الكلاب 46.8% (29 من 62) عند فحص البراز. نسبة الإصابة العالية بالأكياس العدارية في الإبل والخصوبة العالية لهذه الأكياس تشير إلى أن الإبل عائل وسيط هام في دورة حياة هذه الدودة وكذلك النسبة العالية للإصابة بهذه الدودة في الكلاب تشكل خطراً على الصحة العامة.

Summary

An epidemiological survey of *Echinococcus granulosus* was conducted in Tambool area, east Gezira State, Sudan, through meat inspection of slaughtered camels at slaughterhouse and examination of stray dogs faeces. Results of the survey revealed that 70 camels (56.5%) out of 124 examined were found positive for hydatidosis. Twenty-nine out of 62 (46.8%) faecal samples collected directly from the dogs were found positive for *E. granulosus* using coproantigen ELISA. The high prevalence rate of hydatidosis in camels reported in this study and the high fertility rate of cysts obtained from camels indicate that the camel is an important intermediate host in the tapeworm cycle. Moreover, the high prevalence of *E. granulosus* in dogs poses a serious hazard to public health.

Introduction

Cystic echinococcosis (CE) is a zoonotic disease affecting mainly various animal species and humans. It is caused by metacestodes of dog, tapeworms of the *Echinococcus granulosus* complex. The metacestodes usually form fluid filled cysts ('hydatids') located in liver, lungs and other organs. CE is distributed worldwide, acquiring public health or economic significance in areas where extensive livestock production provides suitable conditions for the cyclic transmission between dogs and livestock. CE is considered to be an emerging disease in many parts of the world; in some regions re-emerged after initial successful control (Eckert and Thompson, 1997).

A preliminary report on hydatid disease in some of the intermediate hosts (sheep, goat and cattle) and on the taseworm in the definitive host (the dog) in the Sudan was published by *Eisa et al* (1962). They reported that the infection rates of hydatidosis in cattle, sheep and goats examined in Equatoria and Upper Nile Provinces were 25%, 19.3% and 33.3%, respectively. They reported 86.5% prevalence of the adult worm in dogs in Kapoeta district and 26.6% in Torit district, besides 115 human cases of hydatid disease amongst the Latuka tribe in Torit and Kapoeta in 1960/61.

El Badawi *et al* (1979) encountered an infection rate of 15%, 12% and 10% in cattle, sheep and goats, respectively in western provinces.

Hydatidosis of domestic animals in the central region of the Sudan was surveyed by El Badawi *et al* (1979). They reported that prevalence of hydatidosis in slaughtered animals amounted to 35% in camels followed by 8% in sheep, 4% in cattle and 3% in goats. Saad and Magzoub (1989b) studied the role of sheep and goats in the epidemiology of the disease. They claimed that the role of goats might be excluded from the cycle, since the prevalence in goats was low (4.4%) and the cysts encountered were either calcified or undergoing calcification. In another study conducted by Saad and

Magzoub (1989a), out of 1169 cattle and 119 camels examined, 45 (3.84%) and 93 (48.69%) were found to harbour hydatid cysts, respectively. Fertility rates of cysts were found 42.4% in camels and 29% in cattle. The lung was the favourite site for cysts in camels while the liver was a preferred site for cysts in cattle.

The present study was designed to investigate the epidemiology of hydatid disease in camels and echinococcosis in dogs in the area of Tambool, Gezira State.

Materials and Methods

Abattoir survey

One hundred and twenty-four camels slaughtered at Tambool were examined for the presence of hydatid cysts. The internal organs including lungs, liver, spleen and kidneys were inspected. Animals with cysts like lesions on the surface of these organs and with palpable nodules deeper in the tissue were recorded as suspect positives. These cysts when found, were counted and measured using an ordinary ruler. The lesions were excised intact and examined individually in the laboratory.

The age of these camels was estimated according to camel dentition described by Ramadan (1994). Camels were divided into three age groups (Table 2).

Identification of cysts

The cysts were examined, identified and their fertility and viability were determined using techniques described by Dada *et al* (1979). The liquid contents of cysts, if any, were removed with a syringe. If the amount of the cyst fluid was small it was placed on a slide and examined directly, otherwise the fluid was centrifuged at 1000 rpm for 2 minutes and the sediment was examined microscopically for the presence of protoscoleces. After all the fluid and sediment had been removed, the cyst was cut open and the walls were scraped, membrance materials were pressed between two glass slides and examined microscopically. If the protoscoleces, hooklets were found the cyst was identified as hydatid.

Determination of cysts fertility

After centrifugation of cyst fluid (hydatid sand) a drop of the sediment was transferred to a slide and covered with a cover glass and examined microscopically using 10 x objectives for the presence of protoscoleces. If no protoscoleces was found, the hydatid cyst was identified as sterile.

Sampling for echinococcosis in dogs

Forty-four faecal samples were collected directly from the rectum of dogs from Tambool area.

Sample preparation

Three-ml sample diluent was added to 1 gm faecal sample. The mixture was centrifuged at 3000 rpm for 10 minutes. The supernatant was decanted and stored at -20°C until used.

Enzyme linked immunosorbant assay (ELISA):

The principle of this test is to detect antigens of *E. granulosus* in the faeces of dogs. These antigens react with the anti- *E. granulosus* fixed on the ELISA plate. The test procedure was performed according to the instructions of the manufacture, including the standard samples. In this study, a coproantigen ELISA (CHEKIT ® ECHINOTEST, DR Bommeli AG, CH-3097, Bern-Liebefeld) was applied.

Results

Prevalence of hydatidosis in camels:

From the 124 camels examined, 70 (56.5%) were found to be infected with hydatid cysts; of which 39 (55.7%) were in the lungs, 15 (21.4%) in the liver, 14 (20%) in both liver and lungs and 2 (2.8%) in the spleen (Table 1).

Table 2 shows that the incident of hydatid disease was very high among aged camels; 74% of camels above 10 years were infected. The number of cysts in the lungs ranged from 1-13 cysts, those in the liver from 1-6 cysts, and only one cyst was observed in the spleen. The size of cysts ranged from 1-12 cm in the lung, 1-5 cm in the liver and 1-2 cm in the spleen. The fertility rates of cysts from different organs was 45% for cysts from the lungs, 20% for cysts from the liver and zero% for the two cysts encountered in the spleen as they were sterile.

From the 62 dogs examined in Tambool area, 29 (46.8%) were found positive using the coproantigen detecting ELISA test.

Table 1: Distribution of hydatid cyst in different organs of 70 infected camels slaughtered at Tambool

Site of infection	Number infected	% infected
Liver	15	21.4%
Lungs	39	55.7%
Lungs & liver	14	20%
Spleen	2	2.8%

Table 2: Effect of age in the prevalence of hydatid disease in 124 camels slaughtered at Tambool

Age (in years)	Number examined	Number infected	% infected
4-7	17	4	23.5%
7-10	23	11	33.3%
>10	74	55	74.3%
Total	**124**	**70**	**56.5%**

Discussion

The prevalence of hydatid disease in camels slaughtered at Tambool was 56.5% (70/124). This is relatively high rate when compared to other domestic animals. In the Sudan, Saad and Magzoub (1989a;b) reported a hydatidosis prevalence of 12.9%, 4.4%, and 3.84% in sheep, goats and cattle, respectively. They also reported that the prevalence of hydatidosis in Sudanese camels was 48.69% (93/191). High rates of infection have been reported in camels from different parts of the world. In Libya, Gusbi *et al* (1990) reported that 358 (35.9%) of 998 camels were infected. Euzeby (1982) reported that 56.5% of camels slaughtered in Algeria were infected with hydatidosis. In Nigeria, Dada *et al* (1979) found that out of 3410 camels examined, 1952 (57.2%) were positive for hydatidosis.

The fertility rate of cysts from camels was high; 45% for cysts from lungs and 20% for liver cysts. The highest prevalence rate was reported from camels at the age of >10-year-old; this is because older animals have naturally more time and opportunities to contract the infection than younger animals.

Out of 62 dogs examined in Tambool area, 29 (46.8%) were found positive by coproantigen–ELISA. This high prevalence rate constitutes a great risk to humans in this area. Saad and Magzoub (1986) reported a prevalence of 51% (25/49) in this area. They concluded that the high echinococcosis prevalence in dogs and the high hydatidosis prevalence in camels indicated an ongoing cycle of dog-camel-dog in this area.

The present finding is considered very high when compared with results obtained from other countries (Dada *et al*, 1979; El-Shehabi *et al*, 2000; Guarnera *et al*, 2000; Quhelli *et al*, 1997). The reason for this high rate of infection in dogs in this area could be the unsanitary state of abattoirs. Dogs room freely and regularly visit the weekly market where animals are slaughtered. They feed on condemned or discarded infected organs, most of them had not been denatured in any way. During this study we have observed that consumers do not favour lungs from slaughtered camels, so they are discarded and dogs find access to these rich sources of infection.

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