

The Epidemiology of Cystic Echinococcosis in Nyala, Southern Darfur State, Sudan

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ملخص البحث

جمعت معلومات من مدينة نيالا بولاية جنوب دارفور بالسودان عن انتشار المشوكة الحبيبية (*Echinococcus granulosus*) في الكلاب الضالة وعن معدل إصابة الإبل والأبقار بالأكياس المائية (hydatid cysts). بعد تشريح 26 من الكلاب الضالة وجدت أن نسبة الإصابة بالمشوكة قد بلغت 26.92%، كما أن فحص 205 رأس من الإبل و 763 من الأبقار بمذبح نيالا خلال عامي 1996-1997 أظهر أن المعدل الكلي للإصابة بداء الأكياس المائية (hydatidosis) قد بلغ 79.51% و 6.42% في الإبل والأبقار على الترتيب وشملت أيضا عملية الاستقصاء لتحديد الحالة البيولوجية للكيس المائي والمواقع المفضلة لتواجده داخل جسم الحيوان وقياس حجمه وحجم السائل المائي بداخله ومعرفة عدد الرؤوس ألا وليه (*protoscolices*) في كل واحد منها. عليه فقد تبين أن رئة الإبل هي المكان المفضل لحدوث الإصابة (73.5%) تليها في ذلك الكبد 18.17% ثم الطحال (8.33%) أما بالنسبة للأبقار فتأتي الكبد في المقدمة (58.79%) قبل الرئة (41.27%). أما معدل خصوبة هذه الأكياس فكان 42.5% في الإبل و 26.92% في الأبقار.

Summary

Data on prevalence of *Echinococcus granulosus* in stray dogs and hydatid cysts in camels and cattle in Nyala area were collected and evaluated. Out of 26 stray dogs necropsied, 26.92% showed *Echinococcus* infection. A survey of 205 camels and 763 cattle slaughtered at Nyala slaughterhouse during 1996-1997 revealed an overall infection rate of 79.51% and 6.42% respectively. The biological state, size of the cyst, the predilection sites in the body, the volume of hydatid fluid and the number of *protoscolices* the cyst contained were investigated. The lung was the favourite predilection site for the cysts in camels (73.5%) followed by the liver (18.17%) then the spleen (8.33%), while in cattle, liver was the predilection site (58.73%) followed by the lung (41.27%). Fertility rates of hydatid cysts were 42.59% and 26.92% in camels and cattle respectively.

Introduction

Cystic echinococcosis or hydatidosis is an important parasitic disease caused by a specific tapeworm, *Echinococcus granulosus*. The parasite cycles in a predator/prey relationship between carnivore definitive hosts and herbivore intermediate hosts. Humans may become infected with hydatid cyst if they inadvertently ingest this tapeworm eggs passed in faeces of infected carnivores. The disease has

particularly high prevalence in countries where a close association between dog and man or the domestic animals which act as intermediate hosts, is maintained (Gibson, 1969). Worldwide, the disease was reviewed by Andersen *et al.* (1997). In Sudan, studies on animal echinococcosis were carried out by various authors (Eisa *et al.*, 1962; El Khawad *et al.*, 1976; Saad and Magzoub 1989a and b).

From the work done in the Sudan, the picture of the disease, particularly the epidemiological aspects, has not been satisfactorily revealed.

This study is aimed at investigating the prevalence of the tapeworm in dogs, hydatidosis in camels and cattle and clarifying the potential role of these hosts in transmission of the parasite. This may provide some useful data for the establishment of control measures.

Materials and Methods

A. Examination of dogs:

Twenty six adult stray dogs were captured by baited traps installed at different sites in Nyala Town; eight dogs from the vicinity of the slaughterhouse and 18 dogs from other residential areas of the town. Each dog was killed by an intracardial injection of saturated magnesium sulphate solution. The abdominal cavity was open rapidly and the small intestine was ligated at both ends so as to secure contents and prevent contamination before removal from the carcasses. Intestine from each dog was placed separately in a sterile labelled polythene bag and transported to the laboratory.

Individual intestines were slit open in stainless steel trays containing water. The mucosa was scraped to free attached worms and both the mucosal scrapings and the intestinal contents were washed through an 80-mesh sieve. Material retained on the sieve was washed into a glass container and examined, under strong light against a black background, with a magnifying hand lens. The worms were collected into clean test tubes by pasteur pipettes and counted.

B. Examination of camels and cattle:

Livers, lungs and spleens from 205 camel and 763 cattle carcasses were examined for presence of hydatid cysts. The cysts were removed by dissection from affected organs. Cysts were placed in clean labelled polythene bags and transported to the laboratory. Cysts from each organ were counted and their size and location in the organ were recorded. The fertility was determined by presence of protoscolices and viability was evaluated by stain exclusion and

evagination of protoscolices (FAO/UNEP/WHO.1981). Hydatid fluid was aspirated, its volume in each cyst was measured and the number of protoscolices contained in each cyst was determined using Mc Master slides.

Results

Out of the 26 dogs examined, 26.92% harboured *E. granulosus*. The number of worms recovered ranged between 24 and 15500. According to the trapping site, 50% of the dogs captured in the vicinity of slaughterhouse showed *E. granulosus* infection compared to 16.67% of the dogs captured at other residential areas of the town.

Of the total number of camels examined 79.5% were infected with hydatid cysts. Of these animals, 51.53% were infected in lungs only, 9.82% in the liver only, 5.52% in the spleen only, 15.95% in the liver and lungs, 3.07% in the liver and spleen, 11.04 in the lung and spleen and 3.07% were infected in all three organs. The cyst size varied from 0.3x 0.5cm to 4.5x9cm. Large cysts were found in the lung. The cyst fluid volume ranged between 0.3 and 124ml. Daughter cysts were recovered from two viable and fertile cysts found in one liver. They contained 52 and 37 cysts. The number of protoscolices in hydatid fluid in the fertile cysts ranged between 40 and 1000/ml. Of all hydatid cysts collected, 73.5% were found in the lungs, 18.17% in the liver and 8.33% in the spleen. The biological state of hydatid cysts encountered in livers, lungs and spleen is shown in Table 1.

Table 1: Biological state of hydatid cysts encountered in camel and cattle slaughtered at Nyala slaughterhouse.

Animal species	Infected organs	No. of cysts found	Frequency (%)				
			Fertile and viable	Sterile	Caseated	Semi- Calcified	Calcified
Camels	Lung	635	49.76	6.46	28.35	5.51	9.92
	Liver	157	13.37	54.14	22.93	2.55	7.10
	Spleen	72	43.05	16.67	33.33	1.39	5.56
	Total	864	42.59	15.97	27.78	4.63	9.03
Cattle	Lung	52	26.92	17.1	32.69	17.31	5.77
	Liver	74	27.03	17.57	35.13	6.76	13.51
	Spleen	0	0	0	0	0	0
Total		126	26.98	17.46	34.13	11.11	10.32

Out of 763 carcasses of cattle, 6.42% were found to harbour hydatid cysts. Of these infected animals, 63.27% had cysts in the liver and 36.73% in the lungs. The cysts size ranged between 0.5x0.9 cm and 1.1x 3.5 cm; the largest was found in the liver.

The cyst fluid volume ranged between varied from 2 to 41 ml. No daughter cysts were observed. The number of protoscolices per ml of hydatid fluid in the fertile cysts ranged between 170 and 980. Of all hydatid cysts collected, 58.73% were found in the liver and 41.27% in the lungs.

The biological state of hydatid cysts found in the livers and lungs examined is shown in Table 1

Discussion

In this study, a prevalence rate of 26.92% was recorded for *E. granulosus* infection in adult stray dogs necropsied at Nyala area. This high prevalence seems to bear true epidemiological relationship to the level of cystic hydatidosis observed in slaughtered livestock in the area, especially camels. Improper disposal of condemned affected organs, unauthorized slaughter of meat animal and poor meat hygiene practices were probably behind the high prevalence of the disease reported in this study.

Similar results were obtained by Eisa *et al.* (1962), from dogs in southern Sudan. Dogs collected from the surroundings of the slaughterhouse showed higher prevalence rate (50%) than those captured at other residential areas of the town (16.67%). This may be due to the fact that packs of dogs were regularly seen scavenging around the low fenced slaughterhouse, especially at night. Similar results were also obtained by Saad and Magzoub (1986) who reported a prevalence rate of 51% in dogs in Tampool area. Our results infer that the people most likely to be exposed to the risk of infection are those who are not only live near abattoirs but also keep dogs.

This study revealed that 79.51% of camels and 6.42% of cattle were found to harbour hydatid cysts. This finding conforms, in part, to the results reported by El Khawad *et al.* (1976) who reported prevalence rates of 6.2% and 7.6% in cattle examined in Equatoria and Bahr-el-Ghazal Provinces, respectively.

The high prevalence of camel hydatidosis reported in this study is attributed to the type of animal husbandry in the area where dogs are in close association with domestic animals and to the attitude of

throwing offals to dogs. The high fertility of camel cysts (42.59%) was similar to that found by Saad and Magzoub (1989a). In cattle, the fertility rate of hydatid cysts (26.98%) was in accordance with the results of Tola (1987) but differed from that obtained by Dada (1980) who reported fertility rate of 7.4 in Nigerian cattle. This variation may be due to *E. granulosus* strain dependence.

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