



## Scholars research library

Archives of Applied Science Research, 2011, 3 (6):18-23  
(<http://scholarsresearchlibrary.com/archive.html>)



### Study on hydatid cyst infection in Slaughterhouses in Khartoum state, Sudan

Sahar Adam Mohamadin<sup>1</sup> and Atif Elamin Abdelgadir\*<sup>2</sup>

<sup>1</sup>Ministry of Animal Resources and Fisheries, Khartoum, Sudan

<sup>2</sup>Department of Preventive Medicine & Public Health, Faculty of Veterinary Medicine, University of Khartoum, Sudan

---

#### ABSTRACT

*This study was conducted to estimate the infection rate of Hydatidosis caused by Echinococcus granulosus in cattle and sheep as intermediate hosts in slaughter houses of Khartoum State. An abattoir survey was carried out in 849 cattle and 3850 sheep slaughtered in the study area during January 2010 to June 2010. The highest infection rate (2.8%), was found in cattle followed by sheep (1.4%). The most affected organs in cattle were the lung and liver (37.5% for each). In sheep, the liver was the most infected organ (65.2%), followed by mesentery (21.7%). The records of abattoirs in Khartoum state indicated that Hydatidosis was one of the most frequently encountered parasites during the last six months in Khartoum State.*

---

#### INTRODUCTION

Echinococcosis / hydatidosis is a cyclo-zoonotic parasitic infection caused by the closely related cestodes of the genus Echinococcus, namely, *E. granulosus*, *E. multilocularis*, *E. oligrathrus* and *E. vogeli* (18). Cystic Echinococcosis is an important problem for public health and the economy in many parts of the world. It is one of the most important zoonotic diseases and it is of great social importance (4, 6; 11). Echinococcosis represented a considerable economic and public health significance in different countries (3; 5). The economic importance of Echinococcosis in livestock is due to the condemnation of edible carcasses and offals such as liver, lung and heart. In severe infection the parasite may reduce performance and growth and reduce quality and yield of meat and milk. Additionally, fertility and the value of fleece is reduced due to infection.

In the Sudan, animal Echinococcosis was first reported in 1908 in camel slaughtered in Khartoum (Sudan Veterinary Service Report, 1908). It is very common in domesticated ruminants and dogs in all parts of the country (7, 16, 17). Human hydatidosis in the Sudan was first reported by (5). The main objective of this research work is to have basic epidemiological information about the presence of hydatidosis in slaughter houses in Khartoum State.

## MATERIALS AND METHODS

### Study area

The study was conducted from January 2010 to June 2010 in Khartoum State, which is located in North Eastern part of the centre of Sudan. The state is located between 21°, 25-24°, 45 East and 15°, 9-16°, 45 North. The state covers 20, 736km<sup>2</sup>. Khartoum State is divided into three administration governorates: Khartoum, Omdurman and Khartoum North. The governorates are bounded by North Kordofan in the west and in the north by Nile River State and in the north west by the Northern State and by the White Nile State in the South and Gazeera State in the east. The climate is Semi-desert, dry and hot in summer (maximum temperature of 47.1°C and minimum temperature of 22.7°C). The range of rainfall is 150 mm per year.

### Study population:

The study animals were cattle and sheep slaughtered at Khartoum slaughter houses namely: Elkadaruo, Elsalam, Elsbellouka and Ganaoua. Most of cattle slaughtered were male adult zebu. A small number of cross – breed bulls from dairy farms and occasionally a few female cattle with reproductive problems or poor performance were slaughtered in the abattoirs. Most of sheep slaughtered were male.

### Samples collection:

Regular visits were made to Khartoum abattoirs namely: Elkadaruo, Elsalam, Elsbellouka and Ganaoua twice a week for each abattoir. During each visit, visceral organs particularly the lung, liver, spleen, heart, kidneys, mesentery and skeletal muscles were systematically inspected by visual inspection, palpation and incisions; and the number of hydatid cysts per organ and per species of animal were recorded.

### Retrospective Data:

Retrospective data were collected from annual reports of the Ministry of Agriculture, Animal Wealth and Irrigation, Khartoum state from January to May 2010 to assess pervious occurrence of the disease in visceral organs.

### Data analysis:

Data were analyzed using STATA (Version3) 2003. Descriptive statistic was used for that purpose, counts and percentage were used for presentation of the results in tables. Chi-square ( $\chi^2$ ) was used to measure the significant level of presence of hydatidosis in different organs of cattle and sheep and season.

## RESULTS

The study was planned to investigate the presence of hydatid cysts in slaughter houses in Khartoum State namely: Elkadaruo, Elsalam, Elsbellouka and Ganaoua. A total of 24 hydatid cysts out of 849 cattle were observed giving a percentage of 2.8% and 46 hydatid cysts out of 3850 sheep giving a percentage of 1.4% in slaughter houses in Khartoum State (Table 1). In cattle, the lungs and livers were the most infected organ 37.5% (n= 9), for each of them, kidney 12.5% (n= 3), mesentery 8.33% (n= 2) and skeletal muscles 4.2% (n= 1). Statistically, the difference was found significant ( $P < 0.05$ ). While, in sheep the liver was the most infected organ 65.2% (n= 30) followed by mesentery 21.7% (n= 10), lung 6.5% (n= 3), Skelatal muscles 4.3% (n= 2) and kidney 2.3% (n= 1). Statistically, the difference was also found significant ( $P < 0.05$ ) (Table 2). Retrospective data for cattle and sheep indicated that infection with hydatid cysts

was relatively high in slaughter houses in Khartoum state. A total of positive giving percentage of (1.2%) (n= 89) in January, (1.5%) (n = 67) in February, (0.6%) (n = 39) in March, (3.3%) (n =111) in April and (1.04%) in May. Statistically, the difference was found not significant ( $P > 0.05$ ) Table 3). Distribution of cattle hydatidosis by months from January to May indicated that the difference was found significant ( $P < 0.05$ ) (Table 4). While in sheep hydatidosis the difference was found not significant ( $P > 0.05$ ) (Table 5).

**Table 1: Distribution of hydatid cysts in Khartoum Slaughter Houses in cattle and sheep**

Animal species	Number examined	Positive cases	Positivity (%)
Cattle	849	24	2.8%
Sheep	3850	46	1.4%
<b>Total</b>	<b>4699</b>	<b>70</b>	<b>1.7%</b>

**Table 2: Occurrence of hydatid cysts in different organs of cattle and sheep slaughtered at Khartoum slaughter houses**

Animal species	No. examined	positive cases	Organs Count (%)				
			Lung	Liver	Mesentery	Kidney	Skeletal muscles
Cattle	849	24 <sup>a</sup>	9 (37.5%)	9 (37.5%)	2 (8.33%)	3 (12.5%)	1 (4.2%)
Sheep	3850	46 <sup>b</sup>	3 (6.5%)	30 (65.2%)	10 (21.7%)	1 (2.3%)	2 (4.3%)

Letters: a, b indicated significant association ( $P < 0.05$ )

**Table 3: Distribution of cattle and sheep hydatidosis at Khartoum slaughter houses by**

Month	Total examined	Organs (positive) Counts (%)				Total positive (%)
		Liver	Lung	Kidney	Heart	
January	7029	37 (0.05%)	42 (0.06%)	8 (0.001%)	2 (0.0002%)	89 (1.2%)
February	4461	37 (0.08%)	16 (0.003%)	6 (0.1%)	8 (0.001%)	67 (1.5%)
March	6.44	24 (0.03%)	13 (0.02%)	1 (0.001%)	1 (0.001%)	39 (0.6%)
April	3358	53 (0.02%)	41 (0.01%)	13 (0.003%)	4 (0.001%)	111 (3.3%)
May	8164	71 (0.008%)	3 (0.0003%)	8 (0.0009%)	3 (0.0003%)	85 (1.04%)

Source: Ministry of Agriculture, Animal wealth and Irrigation, Khartoum State. (2010)  
 $P > 0.05$

**Table 4: Distribution of cattle hydatidosis at Khartoum slaughter houses by month**

Month	Total examined	Organs (positive) Counts (%)				Total of positive (%)
		Liver	lung	kidney	Heart	
January	1350	17	30	2	0	49 (3.6%)
February	2000	10	11	2	0	23 (1.2%)
March	2250	10	9	1	0	20 (0.8%)
April	358	23	31	10	0	54 (15.8%)
May	3500	23	3	4	0	30 (0.9%)

Source: Ministry of Agriculture, Animal wealth and Irrigation, Khartoum State. (2010)  
 $P < 0.05$

**Table 5: Distribution of sheep hydatidosis at Khartoum slaughter houses by month**

Month	Total examined	Organs (positive) Counts (%)				Total of positive (%)
		Liver	lung	kidney	Heart	
January	5679	20	12	6	2	40 (0.7%)
February	2461	27	5	4	8	44 (1.7%)
March	3794	14	4	0	1	19 (0.5%)
April	3000	30	10	3	4	47 (1.5%)
May	4664	48	0	4	3	55 (1.8%)

*Source: Ministry of Agriculture, Animal wealth and Irrigation, Khartoum State. (2010)*

*P > 0.05*

## DISCUSSION

Echinococcosis / hydatidosis is a parasitism of human community and its animal. The epidemiology of the disease is greatly dependant on various factors. The prevalence of echinococcosis in the Sudan particularly in the Southern, Western and Central Regions has probably increased in recent years as a result of increased ownership of dogs, while control measures and use of effective mass chemotherapy against both larval and adult stages of the parasite have not yet officially been adopted. This situation is often aggravated by the close association of dogs with domesticated animals and humans. It can also be influenced by human behavior, cultural practices and social structures, land-use, life styles and traditions in various communities (20). On the other hand, wild animals may break into the life – cycle of the parasite due to their preying action on domestic animals. An example is the lion – camel / cattle prey – relationship and hyena – sheep / goats prey – relationship at the western part of the Sudan and possibly else where (7). As seen from our results, hydatid cyst was reported from different slaughter houses in Khartoum State. In the Sudan, both human and animal hydatidosis were prevalent (7; 16, 17). Despite all the studies, the real magnitude of the disease in domestic animals, wild animals and man in the Sudan is still in need of further investigation. Slaughtered animals may pass through several owners on their way to the slaughter house, thus create the difficulty to trace infected animals back to their sources of infection. Improper disposal of condemned affected organs, uncontrolled meat animals slaughter and poor meat hygiene practices are suggested to be behind the occurrence of hydatidosis observed in this study.

The occurrence of bovine hydatidosis in our study was higher in cattle than sheep. This difference could be attributed to the fact that cattle are slaughtered at old age (mostly greater than 7 years of age) increasing the risk of exposure to eggs of *E. granulosus*, while small ruminants are slaughtered at a relatively early age (mostly less than 3 years of age) compared to cattle. In this study, the infection rate (proportion) of hydatidosis in cattle was 2.8% which is lower compared with the prevalence reported by (15) who reported prevalence of 6.42% in cattle examined in Southern Darfur State, and with those found by (9) who reported prevalence rates of 6.2% and 7.6% in cattle examined in Equatoria and Bahr-el-Ghazal State respectively. In contrast, (7) reported a high prevalence rate (25%) in cattle examined in Equatoria province. They attributed this high prevalence rate to the high prevalence rate in dogs (86.5%) in the area. Similarly, a high prevalence rate in cattle (24.8%) was observed by (8) in western Sudan. However, (16) reported a low prevalence rate (3.84%) of bovine hydatidosis in Sudan.

Concerning the location in hydatid cysts of this study, bovine cysts were equal in the lungs and the liver. While most of ovine hydatid cysts were located in the liver. In both cases, the sum of

liver and lung cysts constitute the majority of the cysts observed in this study. These findings concerning the liver and the lung were in agreement with those reported by (7), (17), (16) and (15). This could be due to the fact that lungs and livers possess the first great capillaries sites encountered by the migrating echinococcus oncosphere (hexacanth embryo) which adopt the portal vein route and primarily negotiate hepatic and pulmonary filtering system sequentially before any other peripheral organ is involved. In addition, the lungs were predominantly infected with hydatid cysts than any other organ probably due to the presence of greater capillary beds in the lungs than other organs (12). The kidney, mesentery and skeletal muscles are the least affected organs in the study animals. However, development of hydatid cysts occurs occasionally in other organs and tissue when onchosphere escape into the general systemic circulation (19).

In this study, the results from the retrospective data from the records indicated that infection with hydatid cysts in both cattle and sheep (table 3) was relatively high in slaughter houses in Khartoum state. A total of positive giving percentage of (1.2%) (n= 89) in January, (1.5%) (n = 67) in February, (0.6%) (n = 39) in March, (3.3%) (n =111) in April and (1.04%) in May. Statistically, the difference was found not significant ( $X^2 = 10.12$ ). Distribution of cattle hydatidosis by months from January to May (Table 4) indicate that statistically, the difference was found significant ( $X^2 = 3.7$ ). While in sheep hydatidosis the difference was found no significant ( $X^2 = 8.3$ ). This difference between the rate of infection in cattle per month is due to the fact that the longevity of protoscolices survival at different temperature and time intervals varies. From the results, a large proportion of cysts survived at low temperature (From Jan to May 2010) similar finding were reported by (14). From these data, it could be deduced that hydatid cysts could survive in discarded organs for several days during the cold season, but reduced to several hours during the hot seasons. They hence act as a source of infection to stray dogs and accordingly constitute a great hazard to domestic animals and man.

Based on the results of this study therefore, the establishment of well equipped standardized abattoirs, creation of public awareness in terms of knowledge of zoonotic importance of hydatidosis and control of stray dog in order to minimize the risk of acquiring this important zoonotic disease.

## REFERENCES

- [1] Annual Report of the Sudan vet service (1908). Ministry of Natural Resources, Khartoum.
- [2] Annul Report of the Sudan Vet Service (2010). Ministry of Agriculture, Animal wealth and Irrigation Khartoum State.
- [3] Azlaf, R., and Dakkak, A., (2006). *Vet. Parasitol.* 137, 83-93.
- [4] Benito, A., Carmena, J.L, Martinez, J., Guisantes J.A., (2006). *Vet. Parasitol.* 142, 102-111.
- [5] Christodouloupoulos, G., Theodoropoulos, G., Petrakos, G. (2008). *Vet. Parasitol* 153 (3-4) 368-573.
- [6] Daryani, A., Alaei, R., Arab, R., Sharif, M., Dehghan, M.H. Ziaei, H., 2007. *J. Helminthol.* 81, 13-17.
- [7] Eisa, A.M; Mustafa, A.A. and Soliman, K.N. (1962). *Sud. J. Vet. Sci and Anim. Husb.*, 3(2): 97-108.
- [8] Elkhawad, S.E.; Eisa, A.M; Slepnev, N.K. and Saad, M.B. (1979). *Bull. Anim. Hlth. And Prod. Afr.*, 27:249-251.
- [9] Elkhawad, S.E.; Slepnev, N.K. and Eisa, A.M. (1976). *Sud. J. Vet. Sci. and Anim. Husb.*, 17:68-90.
- [10] Elkhawad, S.E; Eisa, A. M; Abu Baker, M. I; Slepner, N.K. and Elgezuli, A.Y. (1978). *Sud. J. Vet. Sci. and Anim. Husb.*, 19:58-65.

- 
- [11] Garippa, G., Varcasia, A., Scala, A., (2004). *Parasitologia* 46, 387-391.
- [12] Getaw. A. D. Beyene, D. Ayana B. Megersa, F. Abynna. Hydatidosis (2009): *Acta Tropica* 113 221-225.
- [13] Kebeda, W., Hagos, A., Girma, Z., lobago, F., (2009). *North Ethiopia. Trop. Anim. Health Prod.* 41, 865-871.
- [14] Mohammed, A. A. (2004). Some Epidemiological Aspects of *Echinococcus granulosus* Isolate characterization in animals in Darfur Region. Ph.D. Thesis, Faculty of Veterinary Medicine, University of Khartoum, Sudan.
- [15] Mohammed, A.A. (1997). Some Epidemiological Indicators of echinococcosis / hydatidosis infection in dogs, cattle, camels and man in Nyala Twon, Southern Darfur State. M.T.A.H. Thesis U of K.
- [16] Saad, M.B. and Magzoub, M. (1989a). *Sud. J. Vet. Sci. and Anim. Husb.*, 28(1): 27-32.
- [17] Saad, M.B. and Magzoub, M. (1989b). *Sud. J. Vet. Sci. and Anim. Husb.*, 28(1): 33-37.
- [18] Schwabe, C.W. (1968). Epidemiology of Echinococcosis. *Bull. W.H.O*, 39: 131-135.
- [19] Urguhart, G.M., Armour, J., Duncan. J. L, Dunn. A.M., Jennings. F.W., (1996). *Veterinary Parasitology*, second ed. Black well science Ltd., London. UK, pp. 120-129.
- [20] Waston – Jones, D.L. and Macpherson, C. N. L. (1988). *Ann. Trop. Med. Parasit.*, 82:343-356.