

ARE SHEEP PLAYING A MINOR ROLE IN THE PARASITE CYCLE?

Omer, R. A.¹, Elnahas, A. A.², Romig, T.³ and Dauschies, A.¹

¹Institute of Parasitology, Faculty of Veterinary Medicine, An den Tierkliniken 35, 04103 Leipzig, Germany, email: omer@vetmed.uni-leipzig.de,

²Faculty of Veterinary Medicine, University of Khartoum, Khartoum North, PO Box 32, Sudan,

³Institute of Parasitology, University of Hohenheim, Emil-Wolff Str., 70599 Stuttgart, Germany

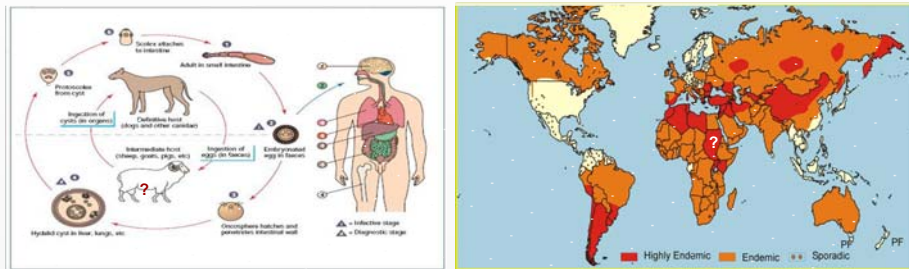


Fig.1 and 2: Life cycle and world-distribution of *Echinococcus granulosus*

Abstract

This study aimed at the determination of the prevalence, parasitological status and genetic identification of hydatid cysts from sheep in different parts of the Sudan. It was concluded that, sheep play a marginal role in the transmission cycle of the disease in Sudan. This fact is different from data obtained from other regions in Africa as well as parts from southern Sudan, where sheep are heavily involved in the transmission cycle of the disease. Both, the prevalence and fertility rates of the disease in sheep in Western Sudan were higher (11.9% and 19% respectively) comparing to those reported in other investigated areas in Sudan. *E.canadensis* (G6) was identified in all samples and confirmed by mitochondrial gene sequencing of a subset of 15 samples which showed 100% identity with the same strain when compared with data on the GeneBank TM (Accession No. 208063).

Materials and Methods

Abattoir Surveys

Multiple visits were made to slaughterhouses in different regions of Sudan (Khartoum, Tamboul and Wad Medani in central Sudan, Nyala in Darfur State (western Sudan), Juba and Malakal in southern Sudan (fig. 3) during the period of May 2001 to July 2003. A total of 10,422 sheep were examined. Lungs, liver, heart, spleen, kidney and peritoneal cavity of slaughtered animals were thoroughly inspected. Prevalence rates, number of cysts /animal, cyst's fertility and predilection sites were determined.

Genetic characterization

In this survey, we used a previously described PCR system (Dinkel *et al.*, 2004) for species discrimination. As this system does not allow to discriminate between subspecific genotypes (G1/G2/G3, or G6/G7), we also sequenced the partial *cox1* and *nad1* genes of a subset of these samples (Bowles and McManus, 1992).

Parasitological examination

Cysts were examined macro- and microscopically. Fertility was determined by microscopic detection of protoscolices in aspirated cyst fluid. Sterile or degenerated (calcified or caseated) cysts were classified as infertile. Samples of protocols or cyst wall from individual cysts were preserved in 70% ethanol for DNA extraction.

Results

The results of the study are summarized in table (1) and Figure (4)

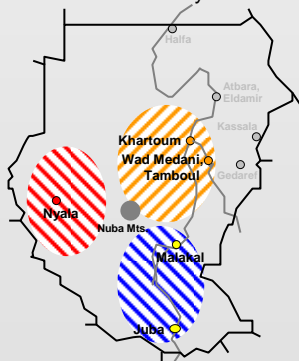


Fig. 3: Map of Sudan with locations mentioned in the text. Halfa, Atbara and Eldamir are referred to as northern, Khartoum, Wad Medani and Tamboul as central, Kassala and Gedaref as eastern, Nyala as western, Malakal and Juba as southern Sudan.

Location in Sudan	No	Prevalence [%] (C.I.95%)	Mean No. of cysts / infected animal	Fertility	Predilection site of cysts	No of cysts examined by PCR (fertile-non-fertile)	Species / genotype (n)
Central	400	2.5 (1.2-4.4)	1.2	0%	Liver (6/12)	12(0-12)	EC(10) G6(5) NR(2)
Western	9727	11.9 (10.9-12.2)	1.3	19%	Periton cavity (1242/1494)	95 (55-40)	EC (93) G6(5) NR (2)
Southern	295	2.7 (1.2-5.3)	1.0	0%	Liver (8/8)	8 (0-8)	EC (8) G6(5)

EC= *E.canadensis* G6/7, NR= No result, PCR: results of species specific PCR system, Suq: mt gene sequencing (*cox1* and *nad1*) for determination of genotype

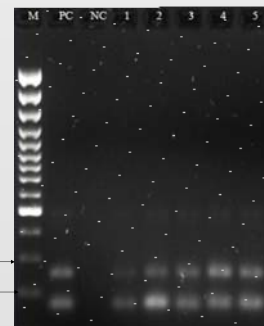


Figure 4: Semi-nested PCR amplification of the 171 bp specific for the camel (G6) strain

Discussion

It is obvious that, sheep play a marginal role in the transmission cycle of the disease in Sudan. This fact is different from data obtained from other regions in Africa as well as parts from southern Sudan, where sheep are heavily involved in the transmission cycle of the disease. This could be attributed to the fact that sheep are usually slaughtered at younger ages before the development of mature cysts. However, in the present study the animals (3-5years) developed calcified or infertile cysts. This may be due to immunoresponce of local Sudanese sheep and goats to hydatidosis infection (Saad and Magzoub, 1989; Omer *et al.*, 2002), or due to the fact that the *E.canadensis* can not express CE in sheep. It may also be concluded that the may have some sort of immunity against *E. Canadensis* as the fertility of the cysts collected from these animals and latterly characterized as *E.canadensis* was very low.

References

- Bowles, J., Balir, D., McManus, D.P. (1992). Genetic variants within the genus *Echinococcus* identified by mitochondrial DNA sequencing. *Mol. Biochemical Parasitology*, (54) 165-174.
- Omer, R. A., Aradaib, I.E.; A.A., Majid, A.A., Mukhtar, O., A.A. Nahhas, 2002. A Survey of hydatid disease in camel, sheep and cattle in Central Sudan. The Proceeding of the 27th International Congress of the World Veterinary Association, Ghartage, Tunisia.
- Saad, M. B and Magzoub, M (1989a). Hydatidosis in camels and cattle in the Sudan. *Sud. J. Vet. Sci. Anim. Husb.* 28(1) 27-32.