Journal of Animal and Veterinary Advances 4 (11): 945-948, 2005
© Medwell Online, 2005

Trypanosoma vivax Infection in Sudanese Cattle in Central Sudan

Abdalla, M.A, Siham, E. Suliman and Amel, O. Bakhiet
Department of Clinical Studies, College of Veterinary Medicine and Animal Production
Sudan University of Science and Technology, P.O. Box 204 Khartoum North, Sudan

Abstract: The investigation conducted during early dry season at an area about 50 km south of Singa, the Capital Town of Sennar State, Central Sudan. Reports were received of excessive mortality and abortion affecting dairy cattle at Sudanese Arab Kenaf Company, situated near Abu Naama village about 50 km south of Singa and 415 km south of Khartoum. The area of the project is 1000 hectare, which 750 hectare are irrigated. The majority of cattle were of Kenana breed, but a few were crosses of Butana X Kenana and Kenana X Friesian breeds. The cattle were sampled and their blood investigated using parasitological diagnostic methods. A total of 177 head of cattle were sampled. A total of 89 animals were found to be infected with trypanosomes. The average parasitological prevalence was 50.3%. All infected animals were infected with *Trypanosoma vivax*. The average PCV of the animals infected with trypanosomes was 20.89 ± 6.39% which was significantly different ($p < 0.001$) than the average PCV of the animals that were parasitological negative (27.17 ± 7.5%).

Key words: *Trypanosoma vivax*, mortality and obsrtion, parasitological prevalence

INTRODUCTION

Animal trypanosomosis is of tremendous importance to the Sudan. It does not only affect the distribution of cattle, but also the distribution and even habits of the principal tribes[1]. In Bahar El Gazal and Equatoria States, the disease is so sever that cattle are not kept in tsetse areas. However, it is in the central region outside the tsetse fly belt, animal trypanosomosis chiefly flourishes, usually in the cattle of the nomadic tribes of central Sudan (The Baggara in Kordofan and Darfur states, Kennana, Rufaa, Seliem of the Blue and white Nile states). These nomads trek their animals from the tsetse free open grass plains into the fly-infested savanna wood-land for dry season grazing where their cattle become infected with trypanosomes[2].

Animal trypanosomosis; *T. vivax, T. conglense* and *T. brucei* are transmitted mechanically by blood sucking and biting flies. This occurs during the rains when cattle have returned for the wet season grazing in central Sudan[3,4].In cattle recently exposed to direct infections in the tsetse area *T. congolens*e is predominant, but as distance from tsetse area increases so dose the proportion of infections due to *T. vivax*. This presumably is an effect of mechanical transmission acting with much ease on *T. vivax* than on *T. congolense*[5,6].

The incident described here is considered to provide evidence for non tsetse fly transmitted trypanosomosis caused by *T. vivax*.

MATERIALS AND METHODS

The investigation conducted during early dry season at an area about 50 km south of Singa, the capital Town of Sennar state, Central Sudan (Fig.1a and b). The area is famous for its indigenous Kenanna breed of dairy cattle and the watish breed of sheep.

The area is generally dry with an effective rainy season from June to September with an annual rainfall of about 300 mm. The temperature degree range from as low as 15c in January (winter) to above 40 °C in the hot dry season (summer).

Natural vegetation is affected by cultivation during the rains and irrigated plots along the bank of Blue Nile. The main trees are of *Acacia* sp. and *Balanites* sp. Grass is plenty during the rains, but it becomes drier and scarce in dry season. For these reason nomadic herds of cattle, sheep and goats are trekked south wards as far as the river Khor Yabus where they contact tsetse and become infected with trypanosomes[7]. On their return at the beginning of the rainy season (June) they intermix with sedentary herds where mechanical transmission of trypanosomosis among other disease occurs, through the agency of biting flies of the families Tabanidae, Muscidae and Hippoboscidae[8].

Reports were received of excessive mortality and abortion affecting dairy cattle at Sudanese Arab Kenaf Company situated near Abu Naama village about 50 km south of Singa and 415 km south of Khartoum.

Corresponding Author: Abdalla, M. A Department of Clinical Studies, College of Veterinary Medicine and Animal Production
Sudan University of Science and Technology, P.O. Box 204 Khartoum North, Sudan
Tel +249 912943128, Fax +249 1 85380136

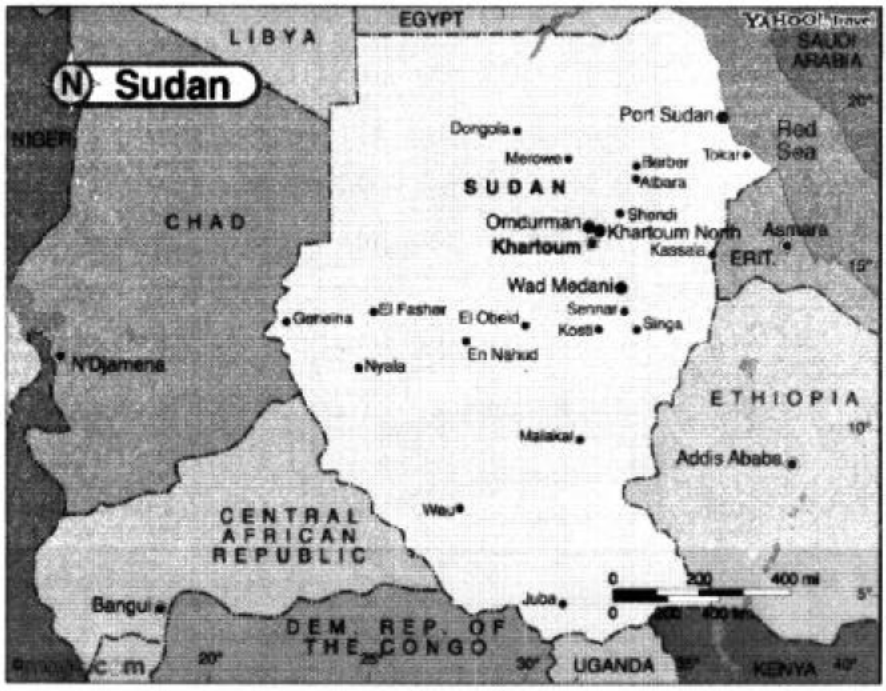

Fig.1a: Sudan overview map

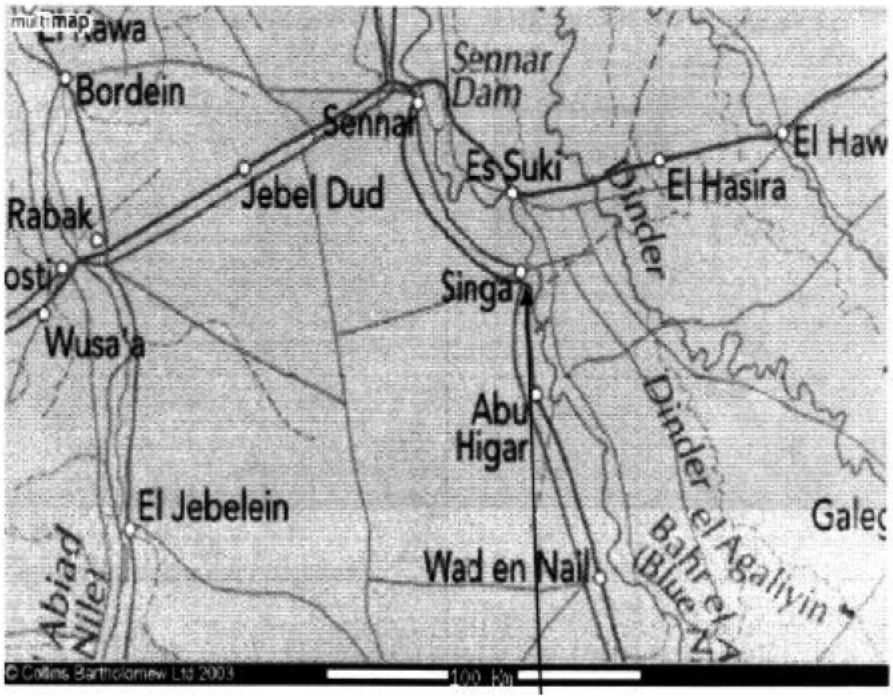

Fig. 1b: Investigation area (50 km south of singa town)

The area of the project is 1000 hectare. Of which 750 hectare are irrigated. The majority of cattle were of Kenana breed but a few were crosses of Butana x Kenana and Kenana x Friesian breeds. These mixed breeds constituted about 2% of the total animals examined. In the project most cattle were milking cows with a few heifers, bulls and calves.

Livestock attendants described a disease condition

characterized by abortion, inappetence, weakness, ataxia, Ptyalism, nasal discharge and watery and mucoid diarrhea. Most deaths occurred within two to three weeks of the on set of the clinical signs but in some the course was more acute death occurring within two to three days.

Investigation of the animals: Intensive clinical investigations have been done for the affected animals.The parasitological diagnostic tests used were those described by Paris *et al.*,[9]. Blood was collected from jugular vein into heparinized microhaematocrit centrifuge capillary tubes and onto glass slides in order to make thick and thin blood smears. The capillary tubes were sealed with Cristaseal (Hawksley) and centrifuged immediately in a microhaematocrit centrifuge for 5 min at 9 000 rpm. After centrifugation, the Packed Cell Volume (PCV) was determined. Animals with a PCV = 24% were considered to be anaemic. The buffy coat and the uppermost layer of red blood cells in each specimen were extracted, placed onto a microscope slide and examined under a phase contrast microscope with a x 40 objective lens for the presence of motile trypanosomes. The thick and thin blood smears were stained with Giemsa and examined under a light microscope using a x 100 oil immersion objective lens.

Statistical analysis: Statistical analysis were carried out in stata 7 (Stata Corp. 2001) for the prevalence rate of the disease and the average PCV data for infected and non-infected animals.

RESULTS

A total of 177 head of cattle were sampled. A total of 89 animals were found to be infected with trypanosomes. The average parasitological prevalence was 50.3%.All infected was infected with *Trypanosoma vivax*. The average PCV of the animals infected with trypanosomes was 20.89 ± 6.39% which was significantly different (P=.0.001) than the average PCV of the animals that were parasitologically negative (27.17 ± 7.5%).

The most of infected animals had high temperature in excess of 41°C, the obvious abnormalities were tachypnoea and unsteady gait with the animals stumbling and eventually collapsing had mucoid diarrhea and ocular and nasal discharges. The mucous membrane was very pale suggesting anemia and the pregnant cows were aborted. Their condition varied from poor to good.

Seven fresh cadavers were available for examination and of these four were in good condition and three were very icteric and there was straw- colored ascites and yellow gelatinous subcutaneous oedema. Petechial haemorrhage was noted on the serosal surfaces of the lungs and kidneys of four cases. The urine was of normal appearance.

DISCUSSION

Trypanosomosis is continuously reported from most parts of the Sudan[2,4,6,10,11]. In this investigation the rate of infection reached 50.3%. The results suggest that trypanosomosis is an important disease of cattle in the area. Taking into account the low sensitivity of the parasitological diagnostic methods and the uncontrolled use of trypanocidal drugs, the real prevalence of infection is probably substantially higher. The prevalence of trypanosome infections increased substantially during the long rainy season (June to Oct) and remained high during the early dry season (November). Outbreaks of acute T. vivax in Ethiopian cattle have been attributed to increased rainfall. D'Amico, Gouteux, Le Gall and Cuisance demonstrated a high level of interaction between cattle and biting flies during the rainy season. The relative epidemiological importance of the various species of biting flies present in the study area was studied[8]The trypanosome infections in area were due to *T. vivax*. This high proportion of *T. vivax* infections is in accordance with observations made in other parts of the Sudan[34,12] and else where.

Furthermore, the role of mechanical transmission of *T. vivax* in such areas cannot be underestimated. Similar conclusions were drawn by Kidanemariam *et al.*,[13] who conducted surveys along the edge of the tsetse-belt in southern Ethiopia. Although it has been shown that *T. congolense* and *T. brucei* can be transmitted mechanically, the transmission rate is usually low[14,17].

The relationship between rainfall andtrypan-osomosis was mentioned in previous work[10]. Mechanical transmission in this study probably encourage by humid climatic condition favoring an increase of biting flies. The incidence of *T. vivax* in the report would suggest that tabanids are efficient vectors especially in absence of tsetse vectors[17].

Evidence indicate that the study area is far away from the tsetse area[7] The intensification of land use and animal husbandry practice in the study area destroyed the biotopes suitable for tsetse and improved conditions for tabanids.

There is evidence that *T. vivax* infection occurs in other tsetse free areas of Sudan[3,18]. In both cases tabanids and stomoxid were considered to be the vector in the absence of tsetse flies. Infection associated with sub acute or chronic disease was seen. Trypanosomes other than *T. vivax* were never seen in blood smears from

these areas which, are considered to be free from tse tse. The conclusion is that *T. vivax* is capable of causing acute disease in Africa without agency of tsetse flies if favorable conditions for tabanids occur.

REFERENCES

1. Lewis, D.J., 1949. Sudan notes and records 30: 179-211.
2. Lewis, D.J., 1953.The Tabanidae of the Anglo-Egyptian-Sudan. Bull. Entomo. Res. 44: 53-78.
3. Suliman, T.A., 1992. Trypanosomiasis in Sennar area with some studies on the related Diptera. M.V.Sc. Thesis Uniker of Khortioum. Sudan.
4. Abdalla, M.A. and K.H. Elmalik, 2002. Studies on the incidence of trypanosomosis in sedentary cattle at Umbenein and Abu Naama areas (Singa area, Sinnar State Sudan). J. Sci. Technol., 3 : 8-13.
5. Leeflang, P., 1975. The predominant of *Trypanosome vivax* infections of cattle at a distance from savannah tsetse concentration. Trop, Anim.Hlth.Production.
6. Kheir, S.M., H.S. Abdalla and A.H. Rahman, 1995. A study on tsetse and tabanidae flies in southern-eastern Sudan. Sud. J. Vet. Sci. Anim. Husb,. 34: 22-28.
7. Mohamed-Ahmed, M.M., 1989. Distribution of Tsetse in Kurmik district Blue Nile Province – Sudan. Sud. J. Vet. Sci. Anim. Husb., pp: 28.
8. Abdalla, M.A. and K.H. Elmalik, 2003. Study of biting flies (Diptera) in Singa area (Central Sudan). J. Sci. Technol., 4: 8-14.
9. Paris, J., M. Murray, and F. Mcodimba, 1982. A comparative evaluation of parasitological techniques currently available for the diagnosis of African trypanosomosis in cattle. Acta. Trop., 39: 307-316.
10. Elkarib, A.E., 1961. Animal Trypanosomiasis in Sudan. Sud. J. Vet. Sci. Anim., Husb., 2: 39-46.
11. Mohamoud, M.M., A.A. Ismail, K.H. Elmalik, M.M. Musa and A.H.A. Rhman, 1993. Animal trypanosomiasis: The Sudan situation In: OUA/STRC.1993 pp: 87.
12. Homeida, T.A., 1993. Some epidemiological studies on animal trypanosomiasis at Sennar, Kosti and Eldueim (Central state, Sudan)M.V.Sc. Thesis Uniker. of Khortoum, Sudan.
13. Kindanemariam,A., K. Hadyu and M. Sahle, 2002. Parasitological prevalence of bovine trypanosomosis in Kindo Koisha district Wallaita zone south Ethiopia.Onder., J. Vet. Res. 69:107-113.
14. Mihok, S., O. Maramba, E, Munyoki and J. kagoiya, 1995. Mechanical transmission of Trypanosoma sp. by African Stomoxyinae (Diptera: Muscuidae). Trop. Med. Parasitol., 46: 103-5.
15. Desquesnes, M. and M. Dia, 2003. Mechanical transmission of Trypanosoma congolense in cattle by the African tabanid Atylotus agrestis . Exp. Parasitol., 105: 226-31.
16. Desquesnes, M. and MI. Dia, 2003. Trypanosoma vivax Mechanical transmission in cattle by one of the most African tabanid Atylotus agrestis . Exp.t. Parasitol., 103: 35-43.
17. Desquesnes, M. and MI. Dia, 2004. Mechanical transmission of *Trypanosoma vivax* in cattle by the African tabanid Atylotus fuscuipes . Vet. Parasitol., 5: 119, 9-19.