Sleeping sickness surveys: game reserve adjacent villages in Malawi

Y Nyasulu, HA Mahomed, DH Molyneux

Although tsetse control measures were discontinued in Malawi in the early 1950s, the prevalence of sleeping sickness apparently remained at low levels. A sleeping sickness survey conducted in 1987 to 1989 revealed a prevalence of the disease of 3% (103/3000). 7% (215/3000) of the individuals tested were positive for malaria. 87 individuals traced 2 years after hospital discharge were found well and active in their villages. 4 died in villages after hospital treatment. 3 relapsed and were readmitted to hospital. Sera from 160 game ranger volunteers and from 82 suspected cases of Rhodesian sleeping sickness were tested by use of ELISA, IFAT and CATT. ELISA and CATT, though not specific, proved to be useful tests for mass screening for human trypanosomiasis. Thick blood smear was found to be the best diagnostic method in this survey.

Introduction

Although Rhodesian sleeping sickness is held in check in most of Malawi, the number of cases in villages adjacent to game and forest reserves has been increasing since 1983, largely because of villagers entering the reserves illegally [1]. This problem made it essential to carry out a survey, for two years, in areas in and around game reserves.

In this study, an intensive survey of human trypanosomiasis was carried out in two areas where sleeping sickness is endemic. Chulu in Kasungu district and Vwaza in the Rumphi district were selected since both areas have a history of sleeping sickness. Transmission was demonstrated in Vwaza during previous surveys [1] and the first reported case in Chulu dated back to 1920 [2,3]. Although similar areas, in which game-fly-man contact leads to sporadic cases exist in Malawi [4], the selected areas had the advantage of the cooperation of local elders, traditional authorities and other community leaders who were willing to assist in community organisation and encouraging villages to come together for meetings and health education on prevention activities.

The primary purpose of this survey was to obtain and understand the complexity of the disease and the interrelationship that will lead to control of it in humans.

Methods

STUDY AREAS: Surveys were carried out in villages adjacent to game reserves: Vwaza and Kasungu game reserves.

COMMUNITY INVOLVEMENT: Meetings with District Development Committees, traditional authorities and community health workers were held; health education on sleeping sickness transmission by use of a poster campaign was undertaken. The efficiency of sleeping sickness surveillance was monitored at District hospitals level and a feedback of information to the community was undertaken monthly by the local health workers. Representative population randomly sampled by age (1-4, 5-14, 15-44+) and by sex was carried out from each identified group.

3000 persons were sampled, out of whom 1051 were also interviewed.

BLOOD SAMPLING AND MICROSCOPE EXAMINATION: Thin and thick blood smear examination were supported by wet blood films, microhaematocrit techniques and serodiagnosis (Card Agglutination Test for Trypanosomiasis - CATT, Indirect Fluorescent Antibody test - IFAT, and Enzyme-Linked Immunosorbent Assay - ELISA).

CLINICAL EXAMINATION: All persons diagnosed with trypanosomes in their blood smears were taken to hospitals for medical examination and treatment; hospital record cards were completed and updated regularly. For identification of people at occupational risk for infection, 15 hunters, 15 honey gatherers, 15 fire wood collectors, 10 fisherman and 30 game rangers were sampled.

Results

103 (3.3%) of the 3000 persons sampled were found to have trypanosomes in their blood smears (21 females, 82 males). The youngest of those males

[a] Ministry of Health, Lilongwe, Malawi and
[b] Department of Biology Science, University of Salford, Salford, United Kingdom
Y Nyasulu Y [a], HA Mahomed [b], DH Molyneux [b]

Correspondence to:
Dr. Y Nyasulu
Ministry of Health
P.O. Box 30377
Lilongwe 3
Malawi

infected with trypanosomes were two boys aged 10 and 12 years respectively; while in the females cases a child of 1 year 9 months was found infected. A 63 year old man amongst the trypanosome positive cases in this study was previously treated at Rumphi hospital for sleeping sickness in 1985. 5 (33%) hunters, 3 (20%) honey gatherers, 3 (10%) game rangers and 1 (7%) fire wood collector were found with trypanosomes in their blood smears. 87 (84.5%) of the cases of trypanosomiasis had fever. Two asymptomatic carriers were found in the population examined; one from Mowa village and another from Wato village remained positive 9 and 5 months respectively after first being diagnosed for trypanosomiasis.

7% (215/3000) persons were diagnosed malaria positive (85 females and 130 males) with the highest incidence (57%) seen in young persons of both sexes aged 1-14; *Plasmodium falciparum* was the predominant infection and 130 cases (61%) showed fever.

Discussion

The human population of the two surveyed areas adjacent to game reserves was estimated to be about 40,750, of which 3000 were sampled during this study; 103 (3%) cases of sleeping sickness were diagnosed. The low prevalence of the disease in the villages at this survey time contrasts with the high prevalence of *T. brucei* species in game animals [5].

Large numbers of game animals live in the game reserves, and the human population in close proximity to the boundaries of the game reserves has increased in recent years. Cattle did not graze inside the confines of the game reserves and their death from bovine trypanosomiasis (*Trypanosoma vivax, T congolense)* infections in 1981-1982 have probably been transmitted by tsetse flies attracted from inside the game reserve [4].

In Vwaza area, it was found that older individuals were more frequently infected with sleeping sickness than younger members of the population. The population infected showed in real terms that the levels of infection were highest in males aged between 20 and 40 years; low infection rates in children have usually been attributed to their low level of contact with the tsetse fly vector [6]. But in this study all members of the population living in villages adjacent to game reserves appeared to be at similar risk.

Game movements allow tsetse flies to thrive and greatly increase in number during the rainy season. During the dry season flies accumulate near the villages and depend more on human beings as a source of food [7]; climatic stresses and lack of game animals for food on the northern and southern edged of Vwaza Marsh, force tsetse flies to feed more often on man.

South of Kasungu game reserve (Lukwa area) where there is a trial for game management area, animals are prevented by an electric wire fence from leaving the reserve boundary throughout the year. Hence tsetse flies do not accumulate near villages, and cases of sleeping sickness do not experience seasonal changes, but reflect endemic conditions [1,8,9]. According to local observations, buffaloes, warthogs, bushpigs, zebras and other animals are seen each year in Manolo and Luwewe areas and particularly during the rainy season. This is supported by the findings in Chulu and Vwaza (see Table); game animals move frequently out of the interior of the game reserve during the rainy season (game rangers personal communication).

Table Prevalence of sleeping sickness by presence of game (%) around the villages in both Chulu and Vwaza

Had sleeping sickness	No.	Game around villages		
		Yes seasonally	Yes constantly	Total (n)
Yes	8	38	55	40
No	25	33	41	1011
Total	259	353	438	1051

Individual circumstances, resources and preferences determine the choice of diagnostic techniques for surveys. For many workers, particularly those with trained microscopists, but few other resources, the stained thick films has the advantage of being simple and cheap [10]; thick film, supported by haematocrit [11] and wet film were used for trypanosomes diagnosis [12]. Wet film examination of haematocrit buffy coat layer (but without phase or dark field microscope) as used by Murray and colleagues [13] to diagnose bovine trypanosomiasis had no advantage in this survey; the risk of accidental infection when cutting the capillary tube also made the technique hazardous.

There were two asymptomatic carriers who remained positive for trypanosomes for 9 and 5 months. Researchers in the Tropical Diseases Research Centre, Ndola, state that such asymptomatic cases do occur (Boatin, personal communication); Wurapa and colleagues also reported a patient from Luangwa area who remained completely asymptomatic for at least one month after being diagnosed positive for trypanosomiasis [9]. Hunters and honey gatherers were found to be at greatest risk of infection from sleeping sickness, and the

diagnosis of human trypanosomiasis in these people needs an inexpensive, simple and reliable technique for use by overworked rural health workers [10].

This study demonstrates that seasonal game movements are of great epidemiological importance in the Rhodesian sleeping sickness endemic foci of Rumphi and Kasungu districts; further studies in other tsetse infested localities will be of importance.

Acknowledgement

The authors thank the staff of Rumphi, Kasungu and Mzambazi mission hospitals, and the traditional authorities for their cooperation and assistance; also to Frank Meke and Hurry Kazula who assisted in the follow up of patients.

References

1. Courtney PT, Courtney ME. Trypanosomiasis in the Rumphi district. *Journal of the Medical Association of Malawi* 1985;2:58-61.
2. Shircre JO. Nyasaland Trypanosome fever. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 1921;6:131-142.
3. Prentice G. Sleeping sickness (letter). *Transactions of the Royal Society of Tropical Medicine and Hygiene* 1921;15:139.
4. Nyirongo MSP. A review of monthly incidence of bovine trypanosomiasis (1966-1981) in Malawi. Report of the Central Veterinary Laboratory, Lilongwe, Malawi, 1982.
5. Dukes P, Scott CM, Rickman LR, Wurapa F. Sleeping sickness in Luangwa valley of Zambia. A preliminary report of the 1982 outbreak at Kasyasya village. *Bulletin de la Societe de Pathologia Exoteque* 1983;76:605-613.
6. Apted FIC. Clinical manifestations and diagnosis of sleeping sickness. In: Mulligan HW, ed. The African Trypanosomiasis. New York: Wiley-Interscience, 1970:661-683.
7. Buyst H. The epidemiology, clinical features, treatment and history of sleeping sickness on the northern edge of the Luangwa flybelt. *Medical Journal of Zambia* 1974;8:2-12.
8. Bell RHV, Mphande JNB. Crop damage Linyangwa area. Research Unit, Kasungu National Park. Report No. 6, 1983.
9. Wurupa FK, Dukes P, Njelesani EK, Boatin B. A healthy carrier of Trypanosoma rhodesiense: A case report. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 1984;78:349-350.
10. Onyango RJ, de Raadt P. Diagnosis of sleeping sickness in medical units with limited laboratory facilities. In: Report of the tenth meeting of the International Scientific Committee for Trypanosomiasis Research (ISCTR), Kampala CCTA.
11. Woo PTK. The haematocrit centrifuge technique for the diagnosis of African trypanosomiasis. *Acta Tropical* 1970;27:384-386.
12. Nyasulu Y, Nkata K, Ingram GA, Molyneux DH. Serodiagnosis of trypanosomiasis: Human sera from sleeping sickness endemic and non-endemic areas in Malawi. (in press).
13. Murray M, Murray PK, Mcintyre WIM. An improved parasitological technique for the diagnosis of African trypanosomiasis. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 1977;71:325-326.

Eye pads

Standard treatment for corneal epithelial loss is an eye pad with local antibiotics. Eye pads can be uncomfortable and the benefit of their use has been questioned. 30 patients with corneal epithelial defects were randomly allocated to two groups: chloramphenicol eye drops plus eye pad (n=16) or chloramphenicol eye drops alone (n=14). 28 corneal defects healed within 24 hours (14 in each group) and the 2 remaining defects healed within 48 hours. Discomfort was greater in the eye pad group. The author concludes that eye pads confer no benefit in healing and are uncomfortable.

Hulbert MFG. Efficacy of eyepad in corneal healing after corneal foreign body removal. *Lancet* 1991;337:643.