

The human trypanosomiasis situation in Gambella, south western Ethiopia

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Abstract: Surveillance of human trypanosomiasis was carried out in Gambella, an endemic region of South Western Ethiopia. The study was conducted in March 1993, October 1993 and April 1994 with the major objective of investigation of the sleeping sickness infection and its vector status in the area. In the present survey no parasitologically confirmed case was detected. The main vectors of the disease, *Glossina pallidipes* and *G. tachinoides* in wooded savanna and forest area and *G. fuscipes* in riverain vegetation, were commonly encountered. Eventhough there were no parasitologically proven cases of sleeping sickness infection due to prolonged combined effect of ecological, climatic and human interference, the presence of potential vectors, *Glossina* species specially along the major river banks, ecological rehabilitation of the area to its previous conditions and the invasion of the game animals might give way to the reappearance of the parasite, *T. b. rhodesiense*. Thus, regular active surveillance of the endemic region is of great importance to control the disease at an early stage before the appearance of epidemics which could be more costly financially as well as in human life. Specific ecological requirements and feeding habits of *Glossina* species, specially of *G. morsitans*, which was not found in this survey, need further investigation. A comprehensive study on community awareness about sleeping sickness and its vector is also recommended to support future control measures. [Ethiop. J. Health Dev. 1997;11(1):23-28]

Introduction

Gambella is the only known endemic area for sleeping sickness in Ethiopia. There was an outbreak of the disease from 1968 to 1970 along the Gilo River where many people died before the disease was recognized as sleeping sickness (1,2). Sporadic cases continued to be detected in the Gilo Clinic and Gambella Hospital (Table 1), after that epidemic.

However, from 1984/85 on wards, Gambella has undergone a drastic ecological change due to extensive deforestation (by settlement, development projects, influx of large numbers of refugees from Southern Sudan) and extensive hunting. These activities have denied the tsetse fly its habitat and thus sleeping sickness cases have decreased significantly.

Since 1991, however, the eco-epidemiological aspect of Gambella is changing to its previous condition. Settlers and almost all the Sudanese refugees, have returned to their original home places. Massive agricultural projects have been terminated or reduced to small scale projects. All these factors would undoubtedly lead to the ecological adjustment of the area to its former conditions which are conducive to sleeping sickness epidemics.

Based on this ecological change of the area, active surveillance was carried out to determine the magnitude of the disease and its vector status. The study was conducted in three consecutive trips,

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March 1993, October 1993 and April 1994 for a duration of one month per trip. The major objective of the study was to investigate the status of sleeping sickness and its vector to help monitor the flareup of epidemics. Besides, community awareness on sleeping sickness and the vector tsetse fly was assessed.

Table 1: Self reporting cases of sleeping sickness infections from 1976 to 1991 from Gilo Clinic and Gambella Hospital.

Year	No. of cases
1976	38
1977	74
1978	30
1979	15
1980	16
1981	13
1982	11
1983	7
1984	1
1985	9
1986	2
1991	1

Source: Gilo Clinic and Gambella Hospital records

Methods

Study area and population. Gambella is located about 800 Km from Addis Ababa on the Western escarpment of the central Ethiopian massif. It is found on latitude 8°N and longitude 35°E. The elevation ranges from 400 to 600 meters above sea level. The elevation where tsetse fly collection and population screening covered ranged from 480 to 510 meters. The region is divided into six Woredas (=districts), namely Abobo, Akobo, Gambella, Godare, Gokna-Jor, Itang and Jikawo. Four major rivers, (Akobo, Baro, Aluvero, Gilo) and several small tributaries crisscross the region. Of the six woredas only three, (Abobo, Akobo and Gokna-Jor) were known to have tsetse fly infestation and cases of sleeping sickness. The present surveillance activities were conducted at Abobo and Gokna-Jor woredas where several cases of sleeping sickness had been reported since the 1970s. Akobo was not included in this study because it was inaccessible.

According to the 1984 population census the total population of the region was estimated at 65,000 (3), more than 50% of them live in the tsetse fly infested areas. Reports from the Regional Office of Agriculture of Gambella indicated that there were 2500 cattle, 1000 goats in Abobo woreda and 1000 goats in Gokna-Jor woreda. No cattle population are found in Gokna-Jor woreda, a relatively densely forested area with minimum human interference. The indigenous people of the area, the Anuak, live mainly along the Baro, Gilo and Akobo rivers. They cultivate maize and millet at small scale subsistence level. The majority are engaged in hunting, fishing and honey gathering. The young men also go to Damballa and Maji areas in Kaffa for gold mining where sleeping sickness is known to exist.

Climate. The climate is generally warm and humid with a prolonged rainy season which begins in late April and continues until the beginning of November with a mean annual rainfall exceeding 980 mm and relative humidity between 45% and 75%. The rest of the year from late November to the beginning of April is hot, the months of February and March being the hottest. The mean maximum temperature is 36.5°C while the mean minimum temperature is 19.3°C (National Meteorological Service, unpublished report, 1994).

Vegetation. The vegetation of the area is predominantly divided into savannah grassland, wooded savannah and forest land mainly along the Gok area. Vegetation in Abobo is dominated by savannah grassland largely of elephant grass, the *Hyparrhenia* species, while the central part is covered mainly by wooded savannah and partly by forest. Riverain, evergreen vegetation is found along the major river systems and their tributaries. The only protected forest land with big trees such as *Combretum*, *Acacia*, *Ficus species*, etc. is found in Gokna-Jor areas.

Wild Life. Gambella used to be reported rich in fauna, about 39 mammal species were recorded the majority of which were found in the Gambella National Park which covers 10,800 sq.km. Most of the land protected for game animals as home is not safely guarded. Some of the animals observed during out trips were bush buck, bush pig, wart hog, hyrax, Kling springier and dick dick. Some of them are known as reservoir host for *T.b.rhodesiense*.

Parasitological investigation. Individuals of ages above 10 years from Abobo and Gokna-Jor woredas were selected using random sampling methods and screened for human trypanosomiasis using different parasitological techniques. The methods applied were mainly Microhaematocrit Buffy Coat Technique (MHBCT) (4) as modified by WHO (5), stained blood smears and wet film mounting. The population were all indigenous, the Anuaks. The blood smears stained at the field with Giemsa were examined in the laboratory for the presence of trypanosomes and other haemoparasites at a magnification of 100X.

Entomological methods. During the trips, the area covered for fly collection was about 12,342.72 sq.km and localities included during the survey are indicated in Fig. 1. The first survey was in March 1993 covering villages in Abobo Woreda, 42 km South of Gambella town. The second and third trips were made in November 1993 and April 1994, respectively, covering villages in GoknaJor Woreda about 120 km from Gambella.

Biconical traps and moving vehicle were the major methods used in most of the areas where conditions were convenient. Collection of resting and biting flies by hand catch was done in some cases.

Two to five traps were set in every survey site for 24 hours. Attempts were made to set traps in all vegetation types, savannah wood land, forest land and riverain vegetation to collect tsetse flies of different habitats based on their ecological preference. Captured flies were identified using standard keys (5) and subsequently counted and sexed. The collected flies were preserved in 70% alcohol for further study.

Results

A total of 1600 blood samples were collected from different villages and screened (Table 2). No parasitologically proven case of trypanosomiasis was detected. But different species of malaria and blood microfilariae were identified. The known potential vectors of trypanosomiasis, *Glossina* species were collected, identified and sexed as shown in Table 3. *G. fuscipes* was the dominant species along the riverain vegetation; *G. pallidipes* and *G. tachnoides* were collected from thickets of bushes. A decline of the efficient vector *G. morsitans* was observed in the present study.

Table 2: Areas visited and total population screened

Date Surveyed	Woreda	Villages	Total Exam.	Parasite Malaria	Ident. Macrofi.	Remarks
March1993	Abobo	Ukuna Kiri	140	20	2*	
						MHBCT*
		Ukun kijan	90	10		
		Perbongo	221	24		
		Damessayai	47	3		
		Fukadi	60	8		
		Terkodi	42	4		
October 1993	Goknajor	Tata	115	21		MFBCT*
		Pinybago	39	4		
		Puchala	101	12	1	
		Akima				
		Gilo	35			
		Dipa	32	5		
		Pinyudo	178	28	2*	
April1994	GokanJor	Jinjo	153	27		
		Dipach	65	11		
		Pentini	20			
		Gilo area	162	32	1	
		Bottjan	100	13		
		Total	1600	224	6	

*Micro filaria identified by MHBCT

Discussion

It is an established fact that Gambella is the only confirmed sleeping sickness focus in Ethiopia (6,7). However, absence of positive cases during the present survey or low prevalence of the disease reported during the previous studies, does not mean that the disease is eradicated or controlled. This can be attributed to the combination of various ecological, climatic and epidemiological factors that minimized man-tsetse fly-game animals contacts.

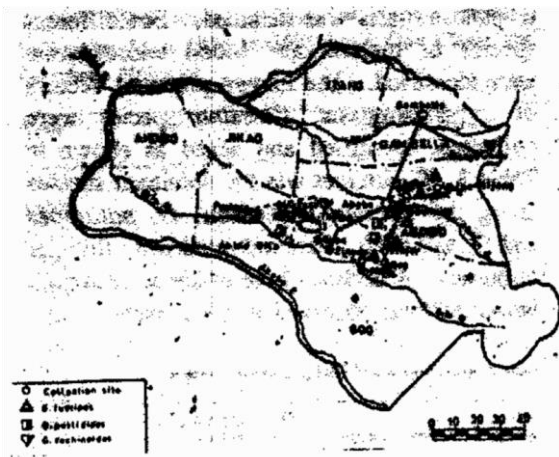


Figure 1: **Gambella: villages and tsetse distribution according to the present survey**

The epidemiology of human trypanosomiasis is complex. The transmission cycle is subjected to between Man-Glossina-Trypanosome interactions and significantly so in rhodesiense of the sleeping sickness, domestic and game animals involved (8). In our survey, lack of positive isolate has a positive correlation with low density of tsetse flies and game animals. In addition some of the localities previously identified as for sleeping sickness, such as Garri and Akobo, were inaccessible by road.

Table 3: **Record of glossina species in Gambella, during three trips.**

Species identified	Male	Female	Total
<i>G. Tachinoides</i>	3	1	4
<i>G. Pallidipes</i>	11	5	16
<i>G. Fuscipes</i>	192	103	295
Total	206	109	315

It is known that establishments of settlement, state farms, development projects and refugee camps temporarily preclude the tsetse fly from its natural habitat forcing it to retreat to areas where there is less human interference. Extensive changes in the vegetation result from forest clearing, which is an integral part of such projects. The impact of these activities on human trypanosomiasis is significant.

In this survey, we were able to testify that densification of thickets previously cleared for settlement and other development projects had taken place to the extent that the original thicket blocks have now joined together to form continuous ones. This vegetation change has led to the creation of new game habitats and with it new apartment for *Glossina* species. *G. fuscipes* were caught within three kilometers of the state farm along the Aluvero River.

This is a focal point where the laborers take bath and the neighboring villages fetch drinking water. The reservoir host of sleeping sickness, (the bush pig, bush buck, dick dick and the wart hog) were also observed in these localities. Hence, such areas need continuous surveillance and monitoring of the situation regularly. This facilitates the control of peridomestic transmission of sleeping sickness infection by *G. fuscipes* as depicted in other countries (9). In this survey traps were set in all different biotopes where tsetse flies can occupy. However, during the dry season sites around

springs, ponds and along the river banks were given more attention, as the flies take shelter in such unfavourable times.

The *Glossina* encountered were *G. tachinoides* and *G. pallidipes* both from open grassland and forest vegetation and *G. fuscipes* dominantly from riverain vegetation. More tsetse flies were collected from riverain vegetation than the savannah and forest types. This might be attributed to the prolonged drought, other climatic and ecological factors in relation to the feeding habit of tsetse flies. Moreover, the disappearance of the efficient vector *G. morsitans* observed during this study needs further investigation.

In a known endemic area, the current strategy for sleeping sickness control is regular active case finding involving population screening and treatment of patients coupled with tsetse fly control (10). Regular surveillance either by a mobile team or trained personnel among the individuals in the area could make it possible to identify the point of transmission and the source of infection. But, in the absence of active surveillance, epidemics may occur at any time. Once an epidemic occurs it will have social and economic consequences which may far outweigh the cost of maintaining surveillance.

Assessment of feasibility of technical, economic and social aspects are all important factors in sleeping sickness and tsetse fly control operation, for which community participation would have a significant impact (10,11).

Investigation of community perception on the relationship of sleeping sickness and its vector tsetse fly, revealed that respondents in age groups below 16 years recognized this fly as a common notorious biting one and identified as "Meio", a vernacular name; but did not have any idea of sleeping sickness. Those in age groups above 16 years, however, knew sleeping sickness, "Okellakai", the local name for the disease. So, the community as a whole could identify the tsetse fly, but did not see it as a vector for sleeping sickness. Respondents in age groups above 30 years, had noticed the seriousness of the disease. Villagers along the Gilo river area had good knowledge about the seriousness of sleeping sickness, because the 1970's epidemic had highly affected the residents. They commented that a lot of tsetse flies were present in the area at that time.

The view forwarded by the majority of the respondents, specially the young age group in the study, was that sleeping sickness is not a serious disease and should not be given too much importance. This obviously is a wrong impression about the disease. In addition, factors that led to the decline of sleeping sickness in the Region, specially in Abobo and Gokna-Jor woredas, had not been well understood by most of the villagers. That is why they held the view that sleeping sickness is not a serious disease. However, the elders had a notion that during epidemics there had been a lot of tsetse flies in the area and human interference with the ecology (flora and fauna) had been minimum, eventhough they could not understand the role of the flies in the transmission of sleeping sickness. Therefore, there is some background which could be used to explain the vectorial role of tsetse flies and hence introduce methods of control through community participation. We recommend, regular active surveillance of the endemic region to control the disease at an early stage before the appearance of epidemic which is more costly both financially as well as in human life. Secondly, strengthening of treatment centers, introducing effective and sensitive diagnostic methods and trained man- power should be adopted for monitoring the disease in the area. Thirdly, specific ecological requirements and feeding habit of *Glossina* species especially of *G. morsitans* needs further investigations. In addition, a comprehensive study on social awareness on sleeping sickness and its vector *Glossina* species is of importance to control the disease.

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