Ovine trypanosomosis: a seroepidemiological survey in coastal Guyana

INTRODUCTION

The trypanosomes, *Trypanosoma vivax* and *Trypanosoma evansi*, are vector-transmitted hemoparasites commonly found in livestock in Africa and Latin America. *Trypanosoma vivax* is found in cattle, sheep, goats and wild ruminants in Africa, where it is spread by the tsetse fly, *Glossina* sp. It causes Nagana in African cattle and sheep, a disease complex characterized by fever, anaemia, reduced fertility, weight loss and mortality (3, 12). In the New World, *T. vivax* infection has been recorded in cattle, buffalo, sheep and goats (15). The tsetse fly is not found in the Americas. Infection is probably mechanically transmitted by biting flies. Three species of Tabanids have been proven to be experimental vectors of *T. vivax* infection of cattle in South America, *Cryptotylus unicolor* (8), *Tabanus importunus* (14) and *Tabanus nebulosus* (13). However, the experimental transmission of trypanosomes by biting insects does not necessarily imply that they play a significant role in the field (9). Suggested reservoirs of *T. vivax* in the New World include cattle and deer (15).

*Trypanosoma evansi* is found in the Middle East, Asia, the Far East, Central and South America and Africa. It has clinical significance in horses, donkeys, camels, bufaloes, cattle and dogs, causing a disease called surra (12). This disease is characterized by intermittent fever, anaemia, dependent oedema, lethargy, loss of condition, nervous signs and eventually death (11). Natural infection has been found in several species of wild animals including the capybara (*Hydrochoerus capybara*), a large rodent found in South America, which has been suggested to be the reservoir (16). Cattle and buffalo in endemic areas can be subclinically infected and may act as reservoirs for other animals (15). In Africa and Asia, the incidence of surra is associated with wet seasonal conditions which increase the population of biting flies, resulting in “surra seasons” (15). The vector in Central and South America has been postulated to be biting flies (4) or the vampire bat, *Desmodus rotundus* (10).

In March 1992, a baseline survey of ovine health on small farms was conducted in Region 5, Mahaica/Berbice, a coastal area of Guyana. The objectives of this study were to evaluate the presence, significance and frequency of selected diseases in target sheep flocks in order to develop appropriate, effective and economical preventive medicine recommendations. As part of this survey, serological testing was done for *Trypanosoma evansi* and *Trypanosoma vivax*.

MATERIALS AND METHODS

In March 1992, demographic data and blood samples were collected from a systematic random sample of sheep on twenty-two farms. Sheep were categorized as ewe, nursing lamb, weaned lamb or ram. Farm of origin,
sex, approximate age, breed and body condition scores were recorded. Blood samples were collected by jugular venipuncture from 163 sheep. Blood samples were centrifuged, serum was pipetted and frozen until laboratory submission.

Serum samples were subjected to Indirect Fluorescent Antibody (IFA) testing for Trypanosoma vivax and Trypanosoma evansi, using the following technique. Antigen slides were made using T. vivax from an experimentally infected goat and T. evansi from infected mice. The smears were air dried at room temperature, fixed in acetone and stored at -20°C. Smears were thawed at room temperature for 15 min, then divided into 3 rows of 7 wells with permanent marker. The test sera, diluted to 1:160 concentration, were incubated for 30 min in humid chambers at 37°C, washed for 10 min in a PBS bath, then incubated with conjugated goat anti-ovine IgG L+H and Evans blue. Slides were then covered with Indirect Fluorescent buffer mountant, air-dried and examined under a 10x eyepiece with 50x objective on a fluorescent microscope. Fluorescence was graded as 0 (negative), 1+ (very weak), 2+ (weak), 3+ (strong) or 4+ (very strong). Samples were considered to be seropositive if any fluorescence was observed (>0). The overall seroprevalence rate of 64% suggests that trypanosomosis is endemic in sheep in species of exposure for the sera which tested positive to both species. This seroprevalence result corroborates the finding of APPLEWHAITA, who found a seroprevalence rate of 63.4% of T. vivax in sheep in Guyana using an ELISA (Enzyme Linked Immuno Sorbent Assay) procedure. The same study found trypanosome infection in 4.6% of sampled sheep, based on examination of stained thick blood films (2). In a survey of cattle in Guyana in 1975, CRAIG found 5 samples out of 1019 (0.6%) to be positive for T. vivax, using examination of stained thick blood films. All infected cattle were from coastal regions (6).

The pathogenicity of New World T. vivax is variable but tends to be lower than of African strains (15). Studies in cattle, sheep and goats have demonstrated that T. vivax infections may be acute, subacute or chronic (1). Trypanosome susceptibility varies between ruminant species, between breeds and between individuals within a breed (6). Asymptomatic infections and mixed infections with Babesia and Anaplasma are common. In symptomatic domestic ruminants, clinical signs include intermittent fever, anaemia and loss of condition (15). Bovine trypanosomosis has been associated with clinical disease, abortion and high mortality in Colombia (17) and Venezuela (5). Recent evidence in French Guiana has associated ovine T. vivax infection with abortion and mortality (7). In sheep in Africa, hair loss from the back, tail and scrotum and peripheral lymphadenopathy have also been associated with T. vivax infection (6). Control measures for T. vivax in Africa include the use of insecticides, trypanocides and tsetse fly trapping. Research is currently underway in Africa in the areas of vaccine development and breeding trypanosome resistant cattle and sheep (12).

This was the first serological evidence of T. evansi in sheep in Guyana. Strains of T. evansi from different geographic areas vary greatly in virulence and economic importance for domestic animals (15). The clinical significance and economic importance of T. evansi infection in sheep in South America are not clearly understood.

CONCLUSION

Further studies are necessary to evaluate the clinical significance and economic impact of T. vivax and T. evansi infection in sheep in Guyana. If these studies determine trypanosomosis to be an important constraint to productivity, research to identify the vectors and reservoirs in Guyana would be justified.

ACKNOWLEDGEMENTS

The authors wish to thank Dr. M. CLARKE, Officer-in-Charge of the Regional Educational Programme for Animal Health Assistants (REPAHA) for facilitating the
sampling by 20 students. Each group of four students was supervised by veterinarians drawn from the Ministry of Agriculture, IICA and the MMA/ADA; to these officers we express our thanks. We also wish to thank the CIRAD-EMVT for laboratory Indirect Fluorescent Antibody testing for trypanosomoses.

REFERENCES


The objective of this study was to determine the seroprevalence rates of Trypanosoma vivax and Trypanosoma evansi in sheep in coastal Guyana. Blood samples were taken from a systematic random sample of one hundred and ninety-three (193) sheep on twenty-two (22) farms in Region 5, Mahâia/Beribe, a coastal area of Guyana. Age, breed, sex, and farm of origin were recorded for all sampled sheep. One hundred and seventy-six (176) serum samples were submitted for Indirect Fluorescent Antibody (IFA) testing for T. vivax and T. evansi. Fluorescence was graded as 0 (negative), 1+ (very weak), 2+ (weak), 3+ (strong) or 4+ (very strong), measured at 1:160 dilution of serum. Samples were considered to be sero-positive if any fluorescence was observed. Indirect Fluorescent Antibody results were received for one hundred and sixty-one (161) samples. One hundred and three (64%) sera were sero-positive for T. evansi only, eleven (6.8%) were positive to T. vivax only and fifty-four (33.5%) were positive for both. As cross reactions occur between T. vivax and T. evansi, it was difficult to determine the true species of exposure for the sera which tested positive to both species. The overall sero-prevalence rate of 64% suggests that trypanosomosis is endemic in sheep in coastal Guyana. This was the first serological evidence of T. evansi in Guyana. Although T. vivax is believed to be pathogenic in sheep, the clinical significance of T. evansi remains unknown. The vector of both species of trypanosomosis in sheep on the north coast of South America also is not known.

Key words : Sheep - Trypanosomiasis - Trypanosoma evansi - Trypanosoma vivax - Epidemiology - Sera - Indirect immunofluorescence - Prevalence - Guyana.

The objective of this study was to determine the seroprevalence rates of Trypanosoma vivax and Trypanosoma evansi in sheep in coastal Guyana. Blood samples were taken from a systematic random sample of one hundred and ninety-three (193) sheep on twenty-two (22) farms in Region 5, Mahâia/Beribe, a coastal area of Guyana. Age, breed, sex, and farm of origin were recorded for all sampled sheep. One hundred and seventy-six (176) serum samples were submitted for Indirect Fluorescent Antibody (IFA) testing for T. vivax and T. evansi. Fluorescence was graded as 0 (negative), 1+ (very weak), 2+ (weak), 3+ (strong) or 4+ (very strong), measured at 1:160 dilution of serum. Samples were considered to be sero-positive if any fluorescence was observed. Indirect Fluorescent Antibody results were received for one hundred and sixty-one (161) samples. One hundred and three (64%) sera were sero-positive for T. evansi only, eleven (6.8%) were positive to T. vivax only and fifty-four (33.5%) were positive for both. As cross reactions occur between T. vivax and T. evansi, it was difficult to determine the true species of exposure for the sera which tested positive to both species. The overall sero-prevalence rate of 64% suggests that trypanosomosis is endemic in sheep in coastal Guyana. This was the first serological evidence of T. evansi in Guyana. Although T. vivax is believed to be pathogenic in sheep, the clinical significance of T. evansi remains unknown. The vector of both species of trypanosomosis in sheep on the north coast of South America also is not known.

Key words : Sheep - Trypanosomiasis - Trypanosoma evansi - Trypanosoma vivax - Epidemiology - Sera - Indirect immunofluorescence - Prevalence - Guyana.

El objetivo del presente estudio fue la determinación de las tasas de seroprevalencia de Trypanosoma vivax y Trypanosoma evansi en ovejas, en la zona costera de la Guyana. Se tomaron muestras de sangre en un grupo de ciento noventa y tres (193) ovejas, escogidas al azar en veintidós (22) fincas de la región 5, Mahâia/Beribe, zona costera de la Guyana. Se recolectaron datos concernientes a la edad, raza, sexo y establecimiento de origen de las ovejas incluidas en el estudio. Ciento setenta y seis (176) muestras de suero fueron sometidas al test de Inmunofluorescencia Directa de Anticuerpos (IFA) para T. vivax y T. evansi. La fluorescencia se graduó en 0 (nagativa), 1+ (muy leve), 2+ (levé), 3+ (fuerte) o 4+ (muy fuerte) y fue medida en diluciones de suero de 1:160. Las muestras fueron consideradas seropositivas cuando no se observó ninguna inmunofluorescencia. Los resultados de la Inmunofluorescencia Directa de Anticuerpos fueron obtenidos para ciento sesenta y un (161) muestras. Ciento tres (64%) sueros fueron positivos para Trypanosoma vivax. De estos, 38 (23.6%) ovejas reaccionaron positivamente a T. evansi. La fluorescencia se graduó en 0 (nagativa), 1+ (muy leve), 2+ (levé), 3+ (fuerte) o 4+ (muy fuerte) y fue medida en diluciones de suero de 1:160. Las muestras fueron consideradas seropositivas cuando no se observó ninguna inmunofluorescencia. Los datos de la Inmunofluorescencia Directa de Anticuerpos fueron obtenidos para ciento sesenta y un (161) muestras. Ciento tres (64%) sueros fueron positivos para Trypanosoma evansi. De estos, 38 (23.6%) reaccionaron positivamente a T. evansi. Una vez que los datos de las reacciones cruzadas entre T. vivax y T. evansi, la determinación de las especies de exposición fue difícil en aquellos sueros con resultados positivos para ambas especies. La seroprevalencia general de 64% sugiere que la tripanosomosis es endémica en esta zona costera de Guyana. A pesar de que se presume que T. vivax es patógeno en la oveja, se desconoce aún la importancia clínica de T. evansi. De la misma manera, se ignora cual es el vector de ambas especies de tripanosomosis en ovejas, en la costa norte de Sur América.

Palabras claves : Ovino - Tripanosomiasis - Trypanosoma evansi - Trypanosoma vivax - Epidemiología - Suero - Inmunofluorescencia indirecta - Prevalencia - Guyana.