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Human Behavior in the Epidemiology and Control of African Trypanosomosis in Kachia Local Government Area of Kaduna State, Nigeria

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Abstract: The aim of this study was to investigate the prevalence of trypanosomosis in white Fulani cattle in Ladduga District, Kachia LGA of Kaduna State and further highlight the importance of human behavior, belief, attitude and activity in the epidemiology and control of African trypanosomosis. A total of 65 animals were sampled randomly. Blood collected from the jugular vein was stored in heparinized blood containers. The standard trypanosomosis diagnostic method was employed. An overall infection rate of 29.2% was recorded in the herd with bulls accounting for 20.0% and cows 32.0%. The average Packed Cell Volume (PCV) of infected animals (23.6±0.4%) was lower than non-infected (36.4±0.7%). These values were statistically significant ($p<0.05$). Clinical signs observed were lacrimation, pale mucus membrane, rough hair coat and presence of ticks. However, despite good appetite and availability of forage, emaciation was observed in 29 animals (45.0%). The trypanosomes encountered were *T. vivax* (42.0%), *T. congolense* (15.7%), *T. brucei* (21.0%) and mixed infection (21.0%). Traps caught only biting flies; Tabanus and Stomoxy species.

Key words: Biting flies, human behavior, mixed infection, *Trypanosoma* spp

INTRODUCTION

One of the greatest constraints to increased productivity and steady marketing of agricultural products and livestock in Africa is the problem of diseases. Of all the diseases endemic to the African continent, trypanosomosis is ranked among the top 10 most important cattle diseases (Samdi *et al*., 2011).

In African countries where trypanosomosis occurs, it is a major public health problem. It is currently estimated that over 60 million people and 48 million cattle are at risk from the 23 *specie* and 33 sub specie of tsetse stretching across 40 countries in sub-Saharan Africa (Kristjanson *et al*., 1999; Kamuanga, 2003). Tsetse transmitted African trypanosomosis is responsible for 55,000 human and 3 million livestock deaths annually (Samdi *et al*., 2010a). The loss in livestock production and mixed agriculture alone is valued at 5 billion US dollars yearly in Africa (Samdi *et al*., 2011). For over 40 years in most African countries chemotherapy is the primary method of trypanosomosis control which has further been complicated by evidence of multiple resistance, fake drugs, lack of alternative drugs, lack of sufficient veterinary services (Samdi *et al*., 2010b) and potential wild/domesticated reservoir hosts (Abenga and Lawal, 2005). It is nearly 100 years of tsetse and trypanosomosis control efforts, but today the problem is still far from being solved. In most African countries, tsetse distribution has remained the same and indeed in some areas, the fly has spread to new areas (Samdi *et al*., 2010b). The incidence of both animal and human trypanosomosis remained high with occasional endemic outbreak despite extensive national and international collaboration on integrated mechanisms to control the disease and its vector. Time has come to re-examine the current control strategies and strengthen the already integrated approaches in light of the changes in ecological and socioeconomic realities, which is already causing resurgence. The trend should be towards cheaper and sustainable methods involving enlightenment of rural communities. Human behavior has been largely neglected in research on parasitic diseases. Only a few careful and comprehensive studies exist of relationship between human behavior and parasitic diseases. The scarcity of such study reflects a long-standing separation of the behavioral disciplines from the physical and biomedical sciences (Dunn, 1976). The aim of this investigation is to determine the prevalence of trypanosomosis and hematological changes in the herd and also review the role of human behavior, beliefs and activity.

Human behavior: Refers to the range of behaviors exhibited by humans, which are influenced by culture, attitudes, emotion, values, thics, authority, rapport, hypnosis, persuasion, coercion and/or genetics. The behavior of people fall within a range with some behavior

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being common, some unusual, some acceptable and some outside acceptable limits (Ajzen, 1987). These include:

- Deliberate consciously health-related kinds of behavior by individuals or groups that serve to promote or maintain health.
- Deliberate behavior that contributes to ill-health or mortality.
- Non-deliberate behavior, i.e., behavior not perceived to be health-related, that nevertheless influences the health of individuals, groups or populations favorably either by enhancing or maintaining the level of health.
- Non-deliberate behavior that contributes to ill-health or mortality (Dunn, 1976; Ajzen, 2002).

Human belief or core faith: The person's set of beliefs, like religion, philosophy, etc. provided sometimes subconsciously by his or her family, peers, social media, culture and the society where he or she lives. In Africa no disease is natural but either a punishment from gods, or evil spell cast by sorcerers or jealous men (Allsopp and Hursey, 2004). Trypanosomosis-infected individuals in the Niger Delta region of Nigeria are believed to be witches or have been bewitched and can only be cured by native doctors not orthodox medicine (Airaulu *et al*., 2001). These individuals serve as a source of infection and their families are stigmatized. In some parts of West Africa it is believed that blood samples collected by survey teams are used for commercial or ritual purposes (Touko *et al*., 1997; Samdi *et al*., 2010a) and blood collected from cattle may kill or make them ill. These encourage poor treatment seeking behavior and hinder survey and control of trypanosomosis (Malele *et al*., 2006).

Human activity: This involves environmental changes that can enable vector/parasite to occupy new niches. When that happens, a pathogen that had been confined to a remote habitat gets a wider distribution and possibly easy contact with the host. Parasites jumping from non-human to human hosts are known as zoonosis. This may occur when humans encroach on wildlife habitats. The agrarian population is profoundly affected by the extent and nature of human activities through their influence on the degree of contact with the vector tsetse fly (Willetf, 1963). Human activities and their relation to the ecology of the fly may to a great extent determine the incidence of the disease. For example construction of new villages and housing developments in rural areas force animals to live in dense populations creating opportunities for spread of disease. Changes in agriculture, destruction of rain forest by building roads, clearing areas for commercial ventures further enhance peoples' encounter with the vectors and other animals harboring trypanosomes thereby increasing the rate of transmission of the disease. Uncontrolled urbanization and rapid growth of cities in many developing countries tend to concentrate large numbers of human and animals, these conditions foster transmission (MacLennan, 1983). Modern transport ships and other cargo carriers often harbor unintended passengers or tourist, which can spread diseases to faraway destinations. With international airplane travel, people infected with a disease can carry it to distant lands before their first symptoms appear. Human settlements, washing, bathing, watering of domestic animals, fishing, lumbering, hunting and transhumance enhance host to vector contact (Riordan, 1976; Willetf, 1963). Human migrations as a result of violent domestic disturbance, flood or drought hinder surveillance and dismantle control measures already established and further spread the disease (Zakari, 2001; Samdi *et al*., 2010b).

Human attitude: The degree to which a person has a favorable or unfavorable evaluation of the behavior in question or deliberate behavior. The level of livestock ownership, perceptions and expectations is linked to specific contributions and participation of the communities. Certain individuals or communities with little or no livestock choose not to contribute in tsetse and trypanosomosis control (Oluwafemi *et al*., 2007). Insufficient incentives, poor monetary benefits for guides, corruption, poor sensitization and illiteracy also hinder free will participation. In some areas traps set to catch flies are stolen, vandalized or set ablaze during bush burning and survey teams are perceived to have ill intention toward the communities. Proliferation of quacks and self-medication with the intention to save money has led to drug resistance and late case detection. The lack of concern for the fight against tsetse and trypanosomosis individually is also a major hindrance. Because of the high mortality of the disease, such situation breeds conflict, tension and panic, survivors flee or are stigmatized (Samdi *et al*., 2010a; Cattand *et al*., 2010)

Problem statement: A Fulani herdsman who migrated from Bauchi State to Wurro Salleh in Ladduga district, Kachia LGA of Kaduna State reported to the Nigerian Institute for Trypanosomiasis Research, Kaduna that his animals are ill and showing the following signs; normal appetite, loss of condition, emaciation, abortion and death. He requested that they be examined.

MATERIALS AND METHODS

On 7th August, 2010 a team of Research Officers from the Institute went to Wurro Salleh in Ladduga district, Kachia Local Government Area of Kaduna State, Nigeria to carry out investigation. Physical examination of animals was done. Under restrain, three millilitre (3 mL) of blood was collected at random from the jugular vein into vacutainer bottles containing Ethylene Diamine Tetraacetate (EDTA). Parasitological examination of the

Table 1: Trypanosome infection rate in cattle in Ladduga district of Kachia LGA, Kaduna State

				Trypanosoma species detected				
Breed and sex	No examined	No positive	Infection %	*T. vivax*	*T. congolense*	*T. brucei*	mixed infection	Overall infection rate (%)
W/Fulani Male	15.0	3.0	20.0	1.0	1.0	0.0	1.0	20.0
W/Fulani Female	50.0	16.0	32.0	7.0	2.0	4.0	3.0	32.0
Total	65.0	19.0	52.0	8.0	3.0	4.0	4.0	29.2

blood was done by using the Hematocrit Centrifugation Technique (HCT) and Buffy Coat Method (BCM). Packed Cell Volume (PCV) of each animal was also determined using a hematocrit reader. Animals found positive were treated with diminazene aceturate at 7.0 mg/kg (7% w/v solution).

RESULTS AND DISCUSSION

On physical examination the cattle exhibited the following signs: lacrimation, pallor of the mucous membranes, dry muzzle, pyrexia, progressive emaciation despite normal appetite and ticks infestation. Half of the herd showed clinical signs in variation. However, emaciation was seen in about 45% of herd along with a normal appetite. The overall infection rate of 29.2% was recorded in the herd which agrees with the findings of Lawani *et al*. (2004). *Trypanosoma vivax* (42.0%) infection was found in 8 animals in the herds, *T. congolense* (15.7%) in 3 animals, *T. brucei* (21.0%) in 4 animals and mixed infection (21.0%) was found in 4 animals in the herds (Table 1). The PCV was higher in animals without infection (36.4±0.7%) compared to 23.6±0.4% in infected animals.

CONCLUSION

There isn't sufficient information on impact of human behavior, tsetse distribution, prevalence and economic impact of trypanosomosis in Nigeria. The absence of information on impact of human behavior, attitude, belief and activities on epidemiology of trypanosomosis has contributed to poor monitoring, surveillance, community participation and inability to implement cost effective control strategies. These have resulted in the negative attitude of national governments and international funding organizations towards control of the disease, leading to collapse of many control projects.

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