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Original article

PREVALENCE AND INFECTION RATES OF TSETSE FLIES CAPTURED FROM SELECTED COMMUNITIES WITHIN KAGARKO LGA, KADUNA STATE, NIGERIA

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ABSTRACT

Tsetse flies are large, biting and blood feeding flies of huge economic and veterinary importance due to their role in transmitting *Trypanosoma* spp that causes Trypanosomiasis. This study was carried out, to establish the presence of Tsetse flies and *Trypanosoma* spp status of the captured flies in the study area using standard biconical traps. A total of 47 Tsetse flies were caught. Sixteen [34.04%] out of the forty-seven flies were male while thirty-one were female representing 31[65.96%] and nine died out of the [47] which was the mortality representing 9[19.15%]. Of the 47 flies, 38 were dissected and identification of Trypanosomes was done by direct observation of dissected organs under a microscope. Thirteen of the thirty-eight dissected flies were found with *Trypanosoma* spp representing 13 [34.21%]. Nine out of the twenty-four dissected female flies were found with Trypanosomes representing 9[23.68%], while only four of the fourteen dissected male flies were found with Trypanosomes representing 4[10.53%]. The study discovered the presence of Tsetse flies of the group *Glossina palpalis palpalis* with more female flies captured and 13 out of 38 of the flies were infected with *Trypanosoma* spp, *T. vivax*, 7(53.85%), *T. congolense,* 5[38.46%], and *T. brucei*, 1[7.69%]. The presence of parasites in captured flies suggests the possibility of transmission of these parasites to humans and livestock residing within Kagarko Local Government Area, as well as those on grazing movements with their cows.

Keywords: *Trypanosoma* spp, Tsetse flies, *T. vivax*, *T. congolense, T. brucei,*

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INTRODUCTION

Tsetse flies, are large biting and blood feeding flies of huge economic and veterinary importance [1]. This is due to the role they play in transmitting Trypanosomiasis caused by *Trypanosoma* spp [2]. Trypanosomiasis, is a re-emerging neglected tropical disease, afflicting domestic, wild animals and humans [3]. It is known as Human African Trypanosomiasis in humans and African animal Trypanosomiasis in animals [4,5]. Trypanosomiasis is ranked ninth [9th] out of twenty-five [25] human contagious and parasitic diseases in Africa [6]. The mortality caused by Nagana is rated around three [3] million in cattles with fourty-eight [48] million more at risk where as human African Trypanosomiasis is responsible for sixty [60] million deaths in humans [6]. With an amount of 6000 to 12,000 million United State Dollars lost yearly to direct production losses in livestock [7]. Other effects of Tsetse flies on humans include increased mal-nutrition due to shortage of meat, milk and related products [8].

The Tsetse fly is estimated to cover about 80% of the country's total area hindering rearing of livestock and creating health risk to humans [9]. Eleven [11] out of the twenty-three [23] species of Tsetse found in Africa are found in Nigeria [10,11]. The most common are *G. p. palpalis, G. longipalpis, G. tachinoides* and *G. morsitans morsitans* [12]. The transmission of African Trypanosomes is feasible with any one of the eleven [11] species available. Although the intensity varies according to the type of vector involved [13]. Just like other African Countries, Nigeria is no exception to the still pending and lingering problems of Tsetse and Trypanosomiasis with major consequences on the agricultural affiliated regions across the states of the country [14].

Therefore, this study was carried out to establish the presence of Tsetse flies and *Trypanosoma* spp status of captured flies in the study area.

MATERIALS AND METHODS

Study area

The study was conducted in Kagarko Local Government Area of Kaduna State, Nigeria. It has the following co-ordinates 9^0 27′0" North, 7^0 41′0"East. Study area is 1,864 km^2 with a population of 240,943 [15]. Major economic activities are farming and rearing of livestock. Dominant tribes include; Koro, Fulani and Gbagyi. The study location was picked due to reported cases of the disease outbreak in some parts of Kagarko Local Government Area, Kaduna state, Nigeria [16].

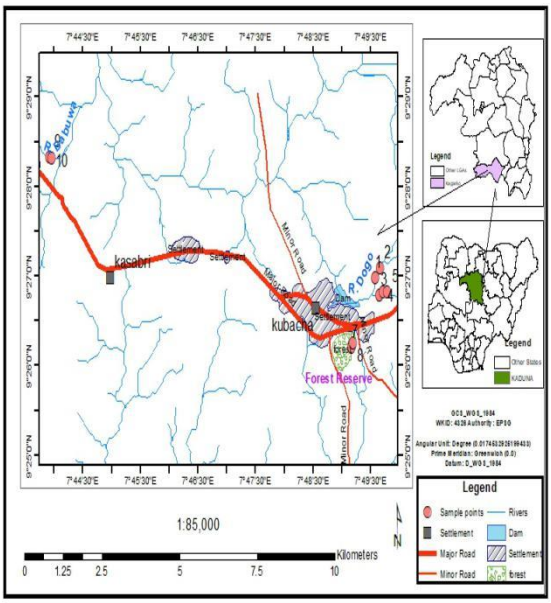

Figure 1: Map of Kagarko LGA, Kaduna showing study locations

Sampling of Tsetse flies

The method described by [17] as cited by [18] was used. Ten [10] standard biconical traps were set 100m apart across the three [3] sampling sites [River Dogo,

Kubacha Forest Reserve and River Babuwa]. Traps were placed in grazing passages of animals and river side where animals pause to drink water. Traps were baited with cow urine and acetone [19] to attract the flies and improve fly catch. Metal poles were greased with oil to stop insects from bugging the traps. The location of each trap was recorded using a GPS [Etrex 10 Garmin]. Traps were allowed to stay at sampling sites for a day before harvesting.

Identification and of sorting of files

Trapped flies were identified, counted and arranged in order of species and sex by certain morphological features. This was possible by using identification key described by [20] cited by [1].

Dissection of flies

This was done under a dissecting microscope following the procedure described by the FAO Training manual for Tsetse control personnel [21] as Cited by [22]. Flies were kept in a petri dish and saline solution was added in drops. After removing the wings and legs, the mouth part was detached and its different parts were disjoined. The salivary glands and the mid guts were also carefully removed and placed between glass slide and cover slip. All these organs were viewed under a microscope [Mg x 400] for the presence of parasites.

Identification of Trypanosomes

The usual technique of microscopy was used in which a direct observation of dissected organs under a microscope was employed [23]. Cited by [24]. Hence, proboscis, salivary glands and midguts were examined. The parasites were identified based on their locations. The parasites found only in the proboscis were recognized as *T. vivax* while those found in both proboscis and midguts were termed *T. congolense*. Parasites associated with mid guts and salivary glands were identified as *T. brucei* and those restricted to the midguts were regarded as un-developed *T. brucei or T. congolense*.

RESULTS

During the study, a total number of fourty-seven [47] *Glossina* spp were captured at the sampling sites. Sixteen out of the forty-seven were male representing 16(34.04%) while thirty-one were female representing 31[65.96%] and nine died out of the [47] which was the mortality representing 9[19.15%].

Trypanosoma parasites were found in thirteen [13] out of the thirty-eight [38] dissected flies representing, 13[34.21%] Twenty-four [24] female flies were dissected, nine [9] were infected with Trypanosomes representing 9[23.68%]. While only four [4] of the fourteen [14] dissected male flies were found with Trypanosomes representing 4[10.53%]. [Figure 2 and 3].

Three strains of *Trypanosoma* spp were found. Thus; *T. vivax* 7[53.84%], *T. congolense*, 5[38.46%] and *T. brucei* 1[7.69%] [figure 4].

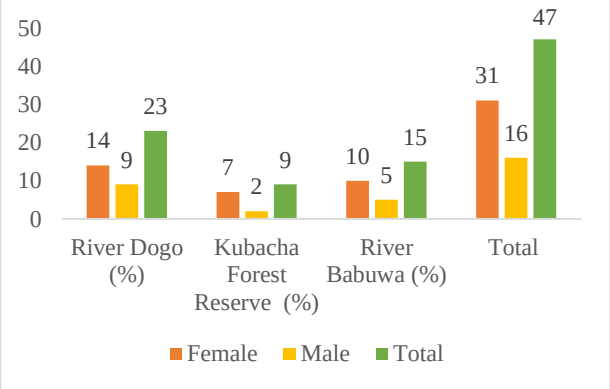

Figure 2: The sex distribution of Tsetse flies in the three sampling sites within

Kagarko Local Government Area, Kaduna State, Nigeria.

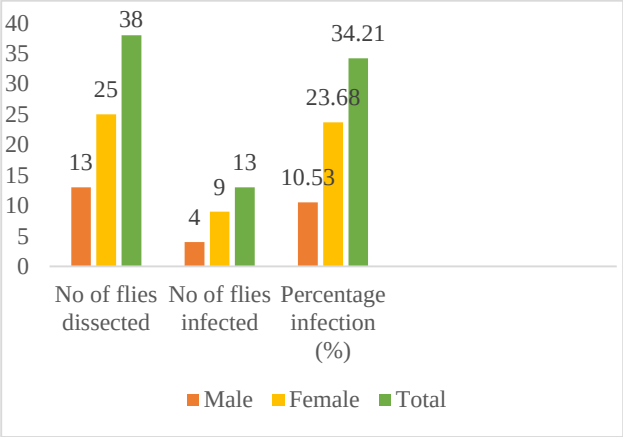

Figure 3: The sex infectivity of Tsetse flies caught among the three sampling sites within Kagarko Local Government Area, Kaduna State, Nigeria.

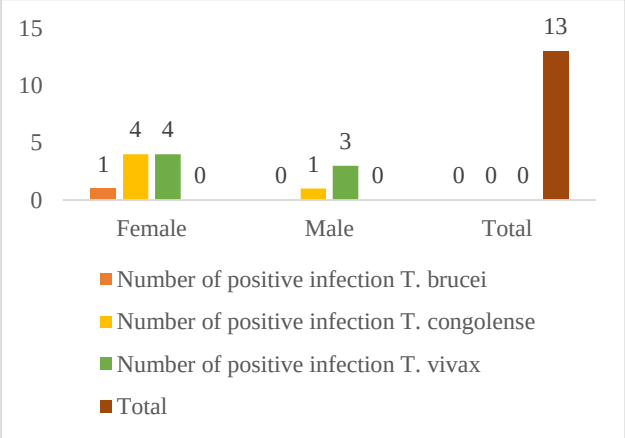

Figure 4: The sex distribution of species of Trypanosomes in captured flies within the three sampling sites in Kagarko Local Government, Kaduna State, Nigeria

DISCUSSIONS

Out of the fourty seven [47] flies caught from the study area, all flies were found to be members of the group *Glossina palpalis palpalis*. Reasons attributed to the sampling points, as the sampling points were along river paths and members of this group are riverine and are also known to withstand and adapt to human occupation and environmental changes as reported by [25]. Same species of Flies were found in a study conducted in Kaduna State [26], FCT Abuja [27] and Delta state [7] all in Nigeria.

In the present study, more female flies were caught than male. Reasons for obtaining such result include the female flies living longer than male flies as reported by [28]. Secondly, the difference in reproductive requirements forces the female to go in search of blood meal more frequently, hence getting captured and represented more in sampled Tsetse population. This result agrees with those of previous studies done in Kaduna State [29], Kaduna State [30], Scotland [31], Ethiopia [32] and Tanzania [33]. Who reported having more female flies than male in their studies. Conversely, it disagrees with a study in Adamawa region of Cameroon [34] and Kaduna State Nigeria [24]. Who both reported having more male flies than female in their studies.

This study obtained an overall infection rate of [34.21%]. Factors that have contributed to getting such result above could include age of flies. Other factors are strain of parasites involved, availability of host and flies' ability to feed. This value is higher than values obtained from studies performed in Kaduna State Nigeria [30], Kenya [35], Ethiopia [22] and Kaduna, Nigeria [24]. Who reported values of [9.4%, 11.5%, 7.5% and 6.6%)] respectively. However, the findings of this study was lower than that reported at Adamawa region of Cameroon [36] who had a value of [40.5%].

Furthermore, Trypanosome infection rate was higher in female Tsetse than male. This has been associated with the longer life expectancy of the female flies and Increase feeding needed for various life processes. Further to that, complexity in the life cycle of infecting parasite could add to the high infection rate in female flies as shown by [37]. This observation is in conformity with the results of studies done in Kaduna State [30], parts of Bauchi & Niger State Nigeria [9] and Ethiopia [22]. On the other hand, the findings are contrary to that of a study carried out in Kaduna State Nigeria [24].

The three (3) strains of Trypanosomes found in the captured flies were *T. vivax, T. congolense* and *T. brucei* with the following values; [53.84%, 38.46% and 7.69%] with *T. vivax* having a higher value. Reasons been that the duration of maturation and the pathway of *T. vivax* in Tsetse is relatively short and simple [38,39,24]. In that its development and maturation into vertebrate infective form occur in the Tsetse proboscis. This is not so with *T. congolense* and *T. brucei* [40,38,41]. The passing of midgut by *T. congolense* and *T. brucei* during their life cycles exposes them to anti-trypanosomal factors such as mid gut trypanolysin and trypanoagglutinin thus killing them in the process [42]. Also, Prevalence of Trypanosomes is known to vary with sex of fly as reported by [37]. This finding agrees with those of studies carried out in parts of Bauchi & Niger State Nigeria [9], Tanzania [42], Kenya [35] and Kaduna State Nigeria [24]. Who all found *T. vivax* as the most prevalent Trypanosome species among infected Tsetse flies.

CONCLUSIONS

The present study has established the presence of only Tsetse flies of the group *Glossina palpalis palpalis* in the study area with thirteen [13] of the thirty-eight [38] dissected flies infected with *Trypanosoma* spp. This resulted in an overall infection rate of [34.21%] and the presence of these strains of Trypanosomes [*T. vivax, T. congolense* and *T. brucei*] implying that there could be possibility of transmission of these parasites to available hosts.

RECOMMENDATIONS

This study therefore recommends Public enlightenment campaign to the locals using their native languages on the dangers of Tsetse flies and the importance of allowing researchers into their community. It also recommends the periodic and point by point collection of blood samples from cattles and humans residing in the study area and those on grazing movement for further detection of these Parasites.

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