Pattern of *Trypanosoma evansi* infection among slaughtered CAMELS (*Camelus dromedarius*) in Sokoto central abattoir

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ABSTRACT

The aim of this research work was to monitor the pattern of *Trypanosoma evansi* infection among slaughtered camels (*Camelus dromedarius*) in Sokoto central abattoir. This study was carried out between June to September, 2012. Two hundred blood samples from different camels were used for the study, and conventional parasitological technique was used to determine the prevalence of infection. Out of 200 camels examined, 63(31.5%) were found to be infected with *T. evansi*. Female camels were found to be significantly more infected, 37(34.64%) compared to males, 26(28.5%). Based on age group, camels aged 10-12 years old were observed to be more infected 8(40.0%) than the other groups, however, the difference between the groups was not statistically significant (P >0.05). Result showed that, animals with body temperature of 39-41°C found to be significantly more infected (44.0%) when compared to those with 34-38°C having prevalence of 29.7%. Findings showed that female camels were found to be more susceptible to be infected and based on age; statistics confirms that all camels have equal chance to be infected with *T. evansi*. However, animals with higher body temperature happens to be more infected. Thus, it’s recommended that prevalence study to be routinely in order to monitor the increase or decrease of the infection, and also bring up to date data for government and researchers about the infection for proper containment.

Key Words: *T. evansi*, Camels, Age, Sokoto.

INTRODUCTION

Camels belong to the Family Camelidae and Genera *Camelus* and *Lama* [1] with two and four species in each genus respectively. These species are *Camelus bacterianum*, *Camelus dromedarius*, *Lama ilama*, *Lama guanicoe*, *Lama pucos* and *Lama vicugna* [2]. Camel is the most efficient domesticated animal for converting fodder into work, transport, milk and meat [3]. Camels serve human beings by providing milk and meat [4].

*Trypanosoma evansi* is the most wide spread pathogenic trypanosome [5]. In Africa, camels are the most important hosts [6], but cattle are reported next most highly susceptible animals [7]. In Nigeria, research studies have shown that donkey, cattle, sheep, and goat are susceptible to *Trypanosoma evansi* but undergo a protracted course of the disease [8].

Biting flies from the species of the Genus *Tabanus*, *Stomoxys*, *Haematobia*, *Chrysops* and *Hippoboscids* primarily transmit *Trypanosoma evansi* mechanically. Biting flies from the species of the Genus *Tabanus*, *Stomoxys*, *Haematobia*, *Chrysops* and *Hippoboscids* primarily transmit *Trypanosoma evansi* mechanically [9].

Trypanosomosis in camels causes considerable economic losses due to decrease in milk and meat, premature births and abortions [10]. Trypanosomosis in camels may be in chronic and acute forms [11] depending on the
susceptibility of the host and virulence of the isolate, with affected animals dying within weeks or months in contrast to chronically infected animals, which may survive for years [12-13].

In acute form, the disease is manifested by elevation of body temperature which is directly associated with parasitaemia. Infected animals show progressive anaemia, marked depression, progressive loss of body weight, dullness, loss of condition, and often, rapid death. The chronic form is most common and may present an association with secondary infections due to immunosuppression caused by *T. evansi* infection, which complicates clinical diagnosis.

Taking into cognisance, the economic impact of the disease to economy of Sokoto and its environs, make this study to be aimed at determining the prevalence of infection in camels slaughtered in Sokoto central abattoir. And to consider the significant prevalence distribution among different gender, age, and body temperature, which may provide a reliable information to which group is more prone to be infected.

The reason for this study was to provide a comprehensive data on the prevalence of *T. evansi* in camels slaughtered in Sokoto central abattoir based on gender, age, and body temperature of camels. This can give an updated data about the infection. In addition to this, it also indicate the group that is more affected. Moreover, it also ease way in control management.

**MATERIALS AND METHODS**

Sokoto is a city located in latitude 13°04′N and longitude 5°14′E in the extreme northwest of Nigeria, near the confluence of the Sokoto River and the Rima River. It has a land area of 125,971 square kilometres. Currently, it has a population of 4,707,024 [14]. Sokoto is the capital of Sokoto State (and its predecessor, the North-western State). Sokoto is in the dry Sahel surrounded by sandy savannah and isolated hills. With an annual average temperature of 28.3 °C (82.9 °F), however the maximum daytime temperature in most of the year generally is under 40 °C (104.0 °F). The warmest months are February to April, where daytime temperatures can exceed 45 °C (113.0 °F). The annual rainfall is about 500 mm. The rainy season is from June to October, during which showers are a daily occurrence. The showers rarely last long and are very different from the regular torrential showers known in many tropical regions. From late October to February, during the ‘cold season’, the climate is dominated by the Harmattan wind blowing Sahara dust over the land. The dust dims the sunlight, thereby lowering temperatures significantly and leading to the inconvenience of dust everywhere in the house [15].

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**Sample Collection**

We randomly selected two hundred sampled camels for the study. Items recorded during the period of blood sample collection are gender, age, and body temperature.

**Analysis of Blood Sample**

Ten (10) mls of blood was collected from each camel at the point of slaughter and transferred into EDTA (Ethylene Diamine Tetra Acetate) bottle. The blood samples were transported to Parasitology Laboratory, Department of Biological Sciences (Usmanu Danfodiyo University, Sokoto) immediately to detect the presence of the parasite (*T. evansi*) using wet mount, thin and thick blood smears. And trypanosomes were identified in blood samples using Conventional Parasitological Techniques (CPT).
Gender determination
Gender was determined as described by [16].

Age determination
The Age of each camel was estimated using the dentition as described by [17].

Body temperature determination
The body temperature was obtained using a thermometer placed in the anal opening for about 2 minutes as described by [18].

Statistical Analysis
The data obtained were subjected to statistical analysis using SPSS (version 16). Chi-square and ANOVA were used to compare mean values of Sex, Age, and Rectal temperature. Results were expressed as Mean ± S.E. and values were considered significant at (P < 0.05).

RESULTS
Out of 200 camels examined, 63 were found to be infected with *T. evansi*. This gives the prevalence of 31.5%. An unidentified filarial worm was detected in the sampled camels’ blood. Female camels were found to be more infected, 37(34.6%) compared to males, 26(28.0%) (Table 1 and Figure 1), the difference between the sexes was statistically significant (P < 0.05).

<table>
<thead>
<tr>
<th>Gender</th>
<th>No. of camels Examined</th>
<th>No. of Camels Infected</th>
<th>Prevalence of Parasite (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>93</td>
<td>26</td>
<td>27.96</td>
<td>0.017</td>
</tr>
<tr>
<td>Female</td>
<td>107</td>
<td>37</td>
<td>34.58</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>63</td>
<td>31.50</td>
<td></td>
</tr>
</tbody>
</table>

*P* value is significant at (P < 0.05) or (P < 0.01).

Infection with *T. evansi* does not seem to be related with age (P>0.05). This is because, camels aged 10-12 years old were observed to be more infected 8(40.0%), followed by 1-3 years old 13(32.5%), then 7-9 years old with 14(30.4%), and 28(29.8%) for the camels that fall within 4-6 years of age (Table 2 and Figure 2).

Figure 1: Prevalence of *Trypanosoma evansi* in relation to sex of camels

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Table 2: Prevalence of *Trypanosoma evansi* in relation to age groups of camels

<table>
<thead>
<tr>
<th>Age group in years</th>
<th>No. of camels Examined</th>
<th>No. of camels Infected</th>
<th>Prevalence of parasite (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>40</td>
<td>13</td>
<td>32.5</td>
<td></td>
</tr>
<tr>
<td>4-6</td>
<td>94</td>
<td>28</td>
<td>29.8</td>
<td>0.514</td>
</tr>
<tr>
<td>7-9</td>
<td>46</td>
<td>14</td>
<td>30.4</td>
<td></td>
</tr>
<tr>
<td>10-12</td>
<td>20</td>
<td>8</td>
<td>40.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>63</td>
<td>31.5</td>
<td></td>
</tr>
</tbody>
</table>

*P value is significant at (P < 0.05) or (P < 0.01).*

Figure 2: Prevalence of *Trypanosoma evansi* in relation to age groups of camels

Based on the animal’s body temperature, results of this study indicate that the highest infection rate was found in camels with body temperature of 39-41°C (44.0%), as compared to those with 34-38°C temperature range (29.7%). The difference between these two groups has attained a significant level (P < 0.05) (Table 3 and Figure 3).

Table 3: Prevalence of *Trypanosoma evansi* in relation to body temperature of camels.

<table>
<thead>
<tr>
<th>Body Temperature (°C)</th>
<th>No. of camels examined</th>
<th>No. of camels infected</th>
<th>Prevalence of Parasite (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>34-38</td>
<td>175</td>
<td>52</td>
<td>29.7</td>
<td>0.000</td>
</tr>
<tr>
<td>39-41</td>
<td>25</td>
<td>11</td>
<td>44.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>63</td>
<td>31.5</td>
<td></td>
</tr>
</tbody>
</table>

*P value is significant at (P < 0.05) or (P < 0.01).*

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Figure 3: Prevalence of *Trypanosoma evansi* in relation to body temperature of camels.

**DISCUSSION**

The overall prevalence of 31.5% found among camels infected with *T. evansi* obtained from this study appeared to be higher than the 14% reported in 2000 by [19] in the same study area here in Sokoto State. In addition, 11.0% and 11.76% reported independently by [20] and [21] from Pakistan. This difference in prevalence could be because the former authors randomly examined blood from relatively fewer numbers of camels (100) during their studies while in this study, we examined 200 camels. However, the observed prevalence in this study was in close range to the 33.0% reported by [22] from camels in Jordan, and lower than the 43.5% prevalence reported by [23].

The significantly higher rate of infection observed in female camels might be due to stress during pregnancy and lactation which could decrease resistance in female camels and render them more susceptible to parasite infections including Surra. [21] and [20] also reported significantly higher infection rates of trypanosomosis due to *T. evansi* in female camels as compared to the males. In addition, [24] suggest that pathological consequences of the infection in pregnant females is directly proportionate to gestation period. However, [25] reported that all camels were equally susceptible to trypanosome infections, if exposed to the same conditions.

The findings from this study revealed high infection rate in the older camels. This conforms to the report of [20] and [21] both on camels in Pakistan. The higher prevalence in older camels might be due to heavy stress through their use for transportation of goods from one place to another and their use as farm animals for farming. This may have weaken and rendered them susceptible to infection. Moreover, it may also be due to poor management [21] which includes the introduction of infected animals to the herd, nutritional deficiencies, searching for undigested seeds in faeces and milk from infected camels [26], lack of proper shelter, poor hygiene etc. However, [25] and [27] reported that all camels were equally susceptible to trypanosome infection regardless of breed and age.

The observed significantly higher *T. evansi* infection recorded in animals with high body temperature may be an indication of the feverish condition of the infected camels. Rise in body temperature is one of the clinical manifestation of trypanosomosis and correspond with the peak of parasitaemia [28]. Several workers [29; 30; 31] have reported this. The lack of significant correlation between *T. evansi* prevalence and host body temperature may probably be the result of the fluctuating nature of body temperature during trypanosomosis. This is because [32] stated that, infection with trypanosomes sets the body temperature at a higher level under the influence of certain mediators. In order to reach this higher set point during fever, heat production most increase or heat loss most decrease. When heat loses are not controlled properly, metabolic rate increase. When regulatory mechanisms are not well balanced, body temperature fluctuates rapidly during trypanosomosis. [33] Also reported the lack of significant
association between \textit{T. evansi} prevalence and host body temperature in Savannah brown bucks infected with Kano isolates of \textit{T. evansi}.

**CONCLUSION**

Result showed that, female camels were more significantly infected with \textit{Trypanosoma evansi} than their male counterpart. Therefore, animal keepers should give them more attention in management especially during lactation period. Based on age, statistics indicates no significant difference between the groups, but result showed older camels were infected then other groups. Increase in body temperature of camels may indicates sign of infectivity to \textit{Trypanosoma evansi} infection, this is because camels with higher body temperature have higher rate of infection.

Recommendations are:
1. Avoid camels visiting endemic areas of vector.
2. Camel keepers should consider an upsurge in body temperature to be one of the indicators for \textit{Trypanosoma evansi} infection.

**REFERENCES**


