



PARASITOLOGICAL STUDY AND CHANGES IN LEVEL OF SOME SERUM ENZYMES IN KANO BROWN GOATS EXPERIMENTALLY INFECTED WITH *Trypanosoma evansi*

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ABSTRACT

*Trypanosomosis is a vector borne protozoan disease that is caused by varied members of the genus, Trypanosoma which affect different species of domestic and wild animals including humans. The disease process provokes alterations in serum enzymes activities in the affected host. This study aimed at investigating the parasitological effects and changes in levels of some serum enzymes activities in Kano brown goats following experimental infection with T. evansi originally isolated from naturally infected camels at Maigatari. Infection was through the jugular veins of the experimental subjects (3 infected and 2 uninfected controls) at dose rate of 2.0×10^6 / ml. The period of study spanned 145 days. Sequel to the infection, infected goats developed clinical trypanosomosis and parasites were detected in the peripheral blood of all infected animals at varied prepatent period between 3 and 7 days post infection (DPI). First peak of mean parasitaemia wave was at 9 DPI and second at 14 DPI and death was recorded on the 70 and 133 DPI respectively among the infected group. After 84 DPI, no parasite could be detected and control subjects remained aparasitaemic throughout the experimental period. For serum enzymes, alanine aminotransferase (ALT) and aspartate aminotransferase (AST), there was significant ($P < 0.05$) elevation in the infected subjects. The study showed *T. evansi* isolate caused infection caused changes in the activities of serum enzymes under study.*

Key words: Experimental infection, Kano brown goats, serum enzymes, Trypanosomosis, *Trypanosoma evansi*.

INTRODUCTION

Trypanosoma evansi is a protozoan parasite responsible for a disease called 'surra' which is mechanically and cyclically transmitted by biting flies (Desquesnes *et al.*, 2013). It is the most widely spread trypanosome globally and is pathogenic to its host (Hoare, 1872). Furthermore, this parasite has the greatest and widest range of host thus positioned within the spectrum of most important animal health problem in sub-Saharan Africa (Teweriet *et al.*, 2013).

On clinical perspective, the disease manifests itself by weakness, fever, anasarca, ataxia, paralysis of the hindquarter and death (Yadevet *et al.*, 2016). Despite *T. evansi* is a primary parasite of camel, there is likelihood that small ruminants herded together with camels especially Kano brown goats may become infected with the parasite and may serve as reservoir host for the agent.

Kano brown goats contributes a great proportion of the goat's population in Nigeria,

and play a significant role in furnishing animal's protein to teaming Nigerian population, and is a veritable tool for the alleviation of poverty in the dry ecozones of the country (Olafadechan and Adebayo, 2016).

Notwithstanding the socio-economic contributions of Kano brown goats to Nigerian food security, the breed has received little attention generally, and in trypanosomosis studies specifically (Finangwaiet *et al.*, 2018). Therefore, the study aimed at investigating parasitological and changes in levels of some serum enzymes activities following experimental infection with *T. evansi* in Kano brown goats.

MATERIALS AND METHODS

Study Site

The study was conducted at the Animal Complex, Department of Animal Health and Production, Binyaminu Usman Polytechnic Hadejia, Jigawa State, Nigeria.

Hadejia lies between 10°36'E Longitude and 12° 30'N Latitude. The vegetation and climate of the area is influenced by both equatorial maritime and the tropical continental air masses. The daily maximum and minimum temperature are 31°C and 19°C respectively. The mean relative humidity can be as high as 80% in the month of August and low as 15% in December (TNFD, 2011).

Donor Rats and Isolation of *T. evansi*

Parasites used for the experiment were obtained from naturally infected camels at Maigatari, Jigawa State, Nigeria (plate 1). Ten albino rats were obtained from the Department of Biological Sciences, BUK. They were inoculated intraperitoneally (I.P.) with 0.5ml of the infected blood in ethylene diaminetetra acetic acid (EDTA) containing 3 - 5 Tryps/field using insulin syringe to clone and transport to experimental site(plate 2).

Experimental Goats

Five apparently healthy matured Kano brown goats of both sexes (3 males and 2 females) aged 3 - 4 years were purchased from Hadejia Animal Market and were transported to the experimental site. On arrival, they were ear tagged and physically examined for ectoparasites, screened for haemoparasites using wet - mount, thin smear and helminthes by floatation and sedimentation techniques. They were accommodated in fly-proof pen and allowed to acclimatize for four weeks as a conditioning process. Experimental animals were dewormed with albendazole orally at therapeutic dose of 20mg/kg body weight. They were fed with groundnut hay, grain offal (*dusa*) and Digitaria hay, water and saltlick *adlibitum*.

Experimental Goats and Infection with *T. evansi*

Experimental animals were randomly divided into 2 groups (A and B), Group A (the experimental group) consisted three (designated 1, 2 and 3) while group B two (designated 4 and 5)(control) goats respectively. The two groups were treated as follows. Group A was experimentally infected while group B served as uninfected control. Fifteen days before infection (DBI), they were closely monitored for clinical signs of illness. At the end of the sixth week, the experimental goats (group A) were challenged via the jugular vein with 2.0 ml of the standard inoculum (diluted infected blood)(Plate 3), each animal receiving $2.0 \times 10^6 T. evansi$ as quantified using Neubauer hemacytometer (Petena, 1963) with grams iodine as diluent. The control (group B) was left uninfected (Plate 3).

Blood Collection

Experimental animals were bled from the jugular vein daily from 15 days before infection (DBI) to 14 days post infection (DBI) and after this period, weekly up to 145 days between the hour of 7.00 and 9.00am (Ogbejaet *al.*, 2011). Whole blood was collected into a sterilized glass tubes containing ethylene diamine tetra acetic acid (EDTA) for parasitological and other glass tubes without anticoagulant for serum biochemistry. Blood samples for serum assay were centrifuged for 15 minutes at 2000 rpm, separated and freeze stored at - 20°C.

Parasitological Method

Trypanosoma evansi (Plate 4) was detected in peripheral blood by standard trypanosome detection methods (STDM) Wet blood film, thick blood film, thin blood film and concentration method using haematocrit concentration technique (HCT) as described by Urquhart *et al.* (1996).

Biochemical Techniques

Serum was analyzed for the concentration of alanine amino transferase(ALT) and aspartate aminotransferase (AST) by commercial kits (Randox Laboratory Ltd).

Statistical Analysis

The data obtained in this study were subjected to statistical analysis by student t-test using statistical package of social sciences (SPSS) updated version 15. Data are presented as mean \pm standard error of mean (SEM) as described by Gomez and Gomez (1984).

RESULTS

Sequel to the experimental infection of the study animals with *T. evansi* Maigatari isolate, parasites were detected in the peripheral blood of all infected goats at different prepatent period between 3 and 7 days post infection(DPI). Mean parasitaemia peaks were observed between 3 and 84 DPI. There were fluctuations in the level of parasitaemia in each of the infected subjects. First peak of mean parasitaemia wave was at 9 DPI and second at 14 DPI(Table 1) (Fig.1). Thereafter, a period of low mean parasitaemia were observed except at 56 and 63 DPI. Death was recorded in the 10th week post infection. After 84 DPI, no parasite could be detected in the blood of the infected subjects (Fig.1). Control subjects remained aparasitaemic throughout the experimental period. The serum enzymes, ALT and AST mean activity values were significantly ($P < 0.05$) elevated in the infected subjects than in the uninfected group(Table 2)(Fig. 2 and 3).

DISCUSSION

From the study, experimental infection of Kano brown goat with Maigatari isolate of *T. evansi* caused disease with incubation period of between 3 and 7 days. This concurs with findings of Youssif(2000) Shehuet *al.*(2010) and Yadav *et al.*(2016). However, Auduet *al.*(1999) reported shorter incubation period in Yankasa sheep. Mean parasitaemia peaks were observed between 3 and 34 DPI and death were recorded on 10th week DPI. Youssif(2000) studied parasitaemia in *T. evansi* infected goats and the parasitaemia reached maximum on day seven, death on day five post infection. However, death was recorded after 33-49 days

as reported by Daganchewet *al.* (2015) in a work in young zebu cattle. Serum enzymes, ALT and AST mean activity values increased in the infected subjects. The rise in activities these enzymes in goats was reported by Kadimaet *al.*(2000), Youssifet *al.*(2008) and Takeedet *al* (2011). Steven and Michael (2000) mentioned AST is the common marker of hepatocyte and muscle damage. Haemolysis and other processes also increase serum AST. Thus, increase activities of both enzymes indicates pathological effect on the liver (Cheesbrough, 2016; Desquesneset *al.*, 2013)

Table 1: Estimated mean parasitaemia per mililitre of blood using the method of Petana (1963) in *T. evansi* experimentally infected Kano brown goats

Days Post Infection	Infected Group Parasitaemia/ml
7	2.8 x 10 ⁴
14	1.5 x 10 ⁵
21	1.3 x 10 ⁵
28	2.8 x 10 ⁴
35	2.5 x 10 ⁴
42	2.0 x 10 ⁴
49	3.0 x 10 ⁴
56	4.2 x 10 ⁴
63	4.0 x 10 ⁴
70	3.3 x 10 ⁴
77	1.8 x 10 ³
84	5.0 x 10 ³

Table 2: Mean serum values of some enzymes in *T. evansi* experientially infected and uninfected Kano brown goats

Parameter	Uninfected Group (n=5)	Infected Group (n=5)	P - value
AST	56.6 ± 2.03	64.9 ± 1.11	0.0096
ALT	20.8 ± 0.61	23.3 ± 0.55	0.0305

P value of 0.05 or lower was considered to be significant.

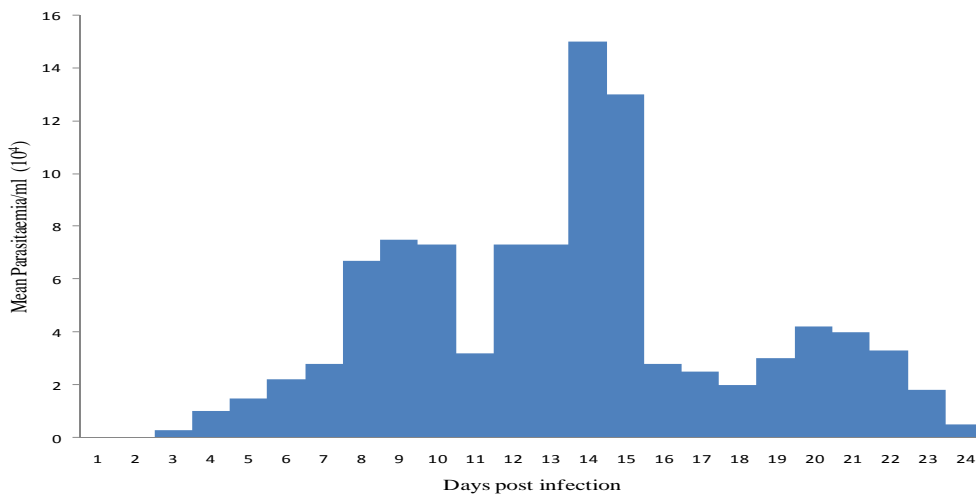


Fig. 1: Post infection mean daily parasitaemia of Kano brown goats experimentally infected with Maigatari isolate of *T. evansi*

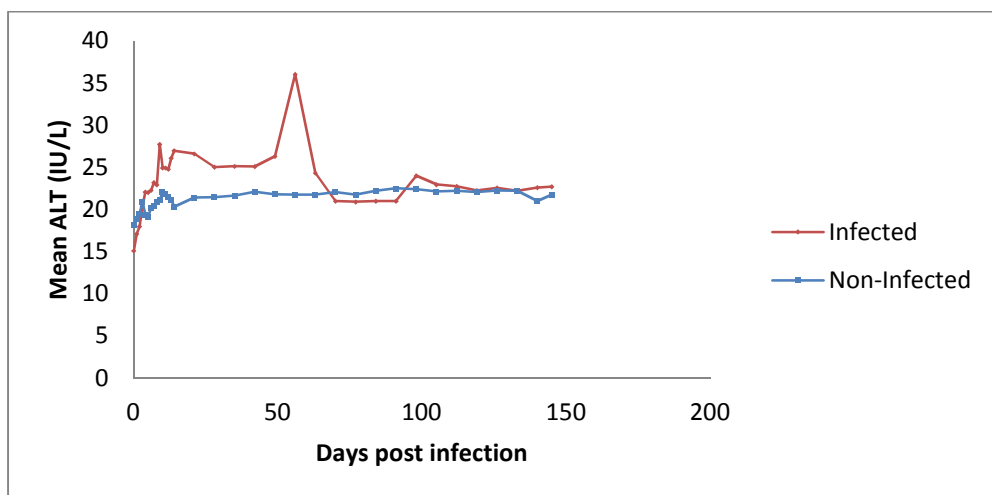


Fig. 2: Post infection mean values of alanine aminotransferase (ALT) of Kano brown goats experimentally infected with Maigatari isolate of *T. evansi* and control

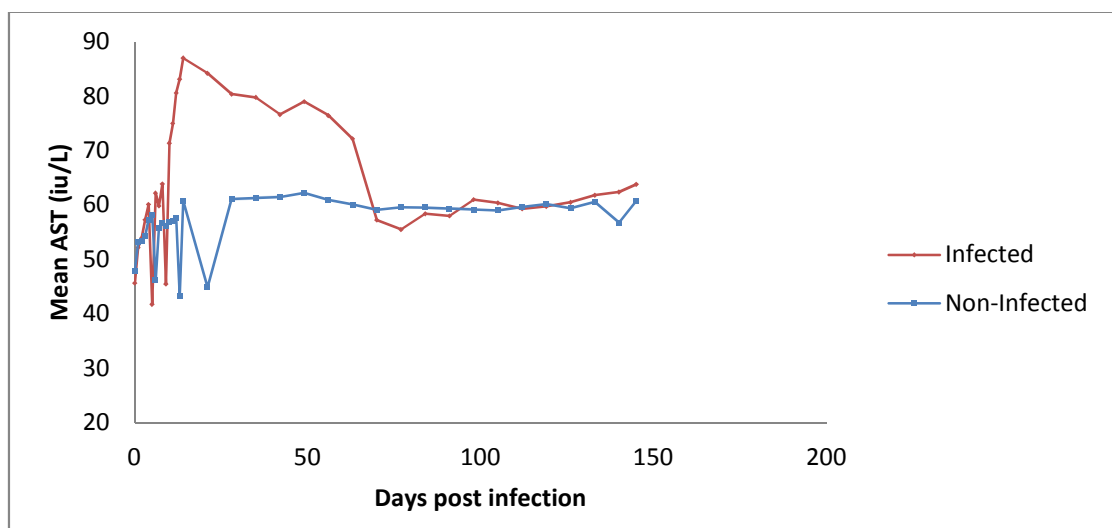


Fig. 3: Post infection mean values of Aspartate aminotransferase (AST) of Kano brown goats experimentally infected with Maigatari isolate of *T. evansi* and control



Plate 1: Bleeding from Mammary Vein of Camel



Plate 2: Albino Rat being inoculated with Camel Blood Infected with *T. evansi*



Plate3: Experimental Goats being Inoculated with Camel Blood Infected with *T. evansi*

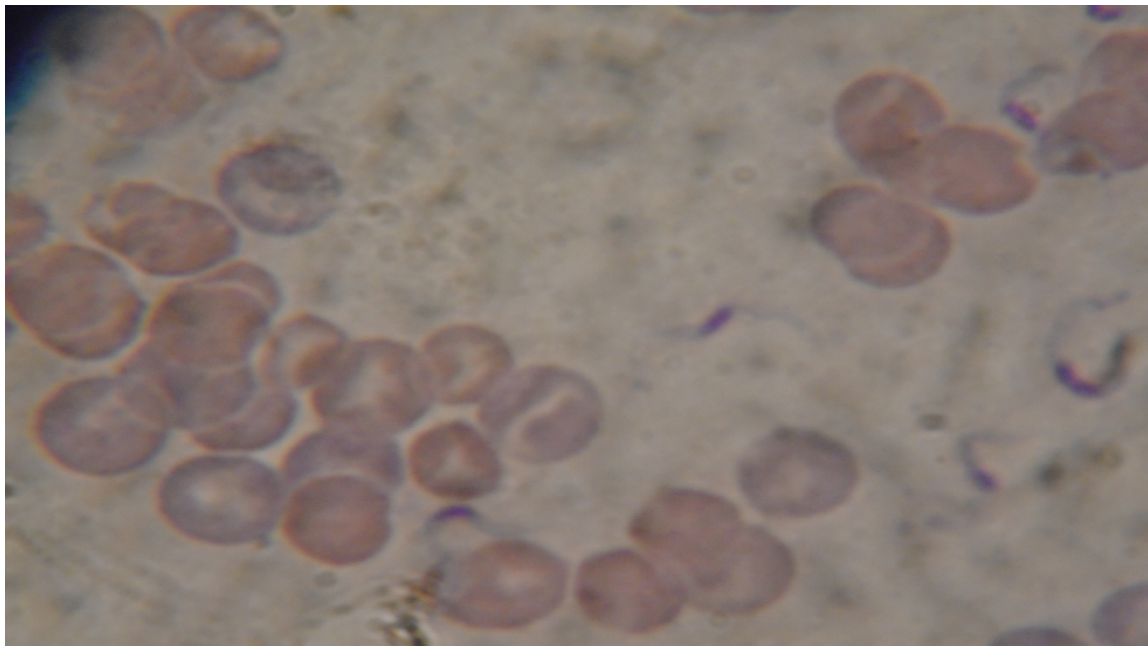


Plate 4: *T. evansi* Infected Blood from Dromedaries at Maigatari International Animal Market

CONCLUSION

The results from the experiment indicated that, the *T. evansi* isolate is infective to Kano brown

goats and significantly brought changes in the levels of serum ALT and AST in the experimentally infected subjects.

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