



# Molecular, Hematological and Biochemical Investigation of *Trypanosoma* spp. in Sheep

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## ABSTRACT

**Background:** *Trypanosoma* spp. is a flagellated unicellular protozoan parasite which caused a disease known as trypanosomiasis in various animals among many areas worldwide resulting in severe economic losses due to morbidities and mortalities. This study was conducted to estimate the prevalence of *Trypanosoma* spp. in sheep using the molecular assay with detection the impact of infection on various risk factors and blood markers.

**Methods:** Totally, 341 sheep were selected from different areas in Wasit province (Iraq) during June to September (2023) and subjected to draining the venous blood that tested molecularly by the conventional polymerase chain reaction (PCR). Status of different hematological, biochemical and mineral markers were further investigated.

**Result:** Targeting 16S rRNA gene, 7.92% animals were positively infected with trypanosomiasis. Relation to risk factors, positive infection and risk were significantly higher in females than males and in sheep aged >1-3 years than others. Hematological findings reported a significant reduction in RBCs and Hb; while biochemically, significant elevation was reported in concentration of urea. Regarding various minerals, insignificant alteration was seen in infected sheep when compared to healthy ones.

**Key words:** 16S rRNA gene, Minerals, Polymerase chain reaction, Trypanosomiasis.

## INTRODUCTION

*Trypanosoma* belongs to *Trypanosomatida* Family of *Kinetoplastea* Order, which first diagnosed in Indian camels by Griffith Evans in 1880 (Eyob and Matios, 2013; Borges *et al.*, 2021). Then, many domestic animals were found to be incidentally infected with trypanosomiasis including *T. congolense* in goats, cattle, sheep, horses and dogs; *T. vivax* for cattle, horse, sheep and goats; and *T. brucei* and *T. evansi* for all mentioned animals as well as camels. Different studies were carried out attempting to clear the higher risk to reinfection with trypanosomiasis in an endemic farms (Auty *et al.*, 2015; Vourchakbe *et al.*, 2023). One of the most important key factors is the survival mechanism that developed by this parasite to escape the host immune response is through antigenic variation and exhibiting on various membrane surface glycoproteins (Cardoso *et al.*, 2016; Pech-Canul *et al.*, 2017).

Consequently, this mechanism makes some of the animals in the infected herds act as a reservoir and reemerging of trypanosomiasis (Jilo *et al.*, 2017). Whenever, the great risk of infection is primarily related to the existence of nearby wildlife reservoir such as bushbuck (*Tragelaphus scriptus*), warthog (*Phacochoerus aethiopicus*), bush pig (*Potamochoerus porcus*), lion (*Panthera leo*), white rhinoceros (*Ceratotherium simum*), leopard (*Panthera pardus*) and wild Equidae as well as hematophagous flies (stable flies, *Tabanids* and *Stomoxys*) that transmit the disease (Maharana *et al.*, 2019; Eid *et al.*, 2023; Agrawal *et al.*, 2024).

The transmission of infection to various animals can occur *via* several routes; however, the most commonly is the cyclical transmission when the parasite is inoculated

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with saliva of infected tsetse flies (Abdi *et al.*, 2017). Other routes are the mechanical transmission by biting insects especially when interrupting during feeding and intrauterine during partum by vertical transmission (Desquesnes *et al.*, 2013). Oral transmission of trypanosomiasis may also occur particularly after birth with *T. brucei* when calved animal ingested contaminated blood and fluid during parturient; however, this route also reported in carnivores when fresh infected prey is eaten (Fagiolo *et al.*, 2005; Salman and Steneroden, 2014). The high risk of re-infection and outbreak occurrence is usually differently related to the prevalence of vectors in the endemic area which depends mostly on the climate factor-like temperature and humidity in tropical regions that are favorable for vector breeding all year seasons (Liu and Zhou, 2015; Maharana *et al.*, 2016). Also, the seasonal influence is related to activity of vectors climate changes outcome (Booth, 2018).

Since many factors may impact on the prevalence of trypanosomiasis including ecological zones, type of