*Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231– 6345 (Online)*
*An Online International Journal Available at http://www.cibtech.org/jls.htm*
*2023 Vol. 13, pp. 1-6/Wjdan*
***Research Article (Open Access)***

# EFFICACY OF TRYPAN (THE QUINAPYRAMINE SALTS), AND BERENIL (DIMINAZINE ACETURATE) AS A TREATMENT OF CAMELS NATURALLY INFECTED WITH *TRYPANOSOMA EVANSI*

**Wjdan Ayad Abdlnabi Al Suwaye***
*Department of Biology, Faculty of Science, Regdalin,*
*Sabratha University. Libya.*
**Author for Correspondence*

## ABSTRACT
The present work was conducted to study the efficacy of the Quinapyramine salts, namely Trypan and Diminazine aceturate namely Berenil as a treatment for camels naturally infected with *Trypanosoma evansi*. A total of forty camels naturally- infected with *Trypanosoma evans*i were used in the present study in simple randomized design. A total of forty camels naturally- infected with *Trypanosoma evans*i were divided into two groups. There were twenty camels in each group, The results of the present work indicated that all camels naturally- infected with *Trypanosoma evans*i, from the first group were completely recovered after the first injection with Trypan subcutaneously at dose rate 7.4mg/kg.s.c. While twelve camels naturally-infected with *Trypanosoma evans*i, from the second group were recovered after the first injection with Berenil subcutaneously at dose of 3.5 mg/kg and the remaining eight camels naturally- infected with *Trypanosoma evans*i were needed second injection at same dose after one week. In conclusion, the results of the present study indicate that Trypan was more efficient than Berenil when was used for treatment *Trypanosoma evans*i infection in camels.

***Keywords****: Quinapyramine salts, Trypan, Diminazine aceturate, Berenil, Treatment of Camels, Infection with Trypanosoma evansi*

## INTRODUCTION
Camel trypanosomosis, known as surra, is a disease of camels caused by *Trypanosoma evansi*. The disease is the most important single cause of economic losses in camel rearing areas, causing morbidity of up to 30.0% and mortality of around 3.0% (Ngerenwa *et al.*, 1993; Egbe-Nwiyi and Chaudry, 1994; Pacholek *et al.*, 2001; Njiru *et al.*, 2002). The causative agent, *Trypanosoma evansi*, was discovered by Griffith Evans in 1880 in infected camels and equids in the Dara Ismail Khan district of Punjab (Indrakamhang, 1998). Since then, studies have shown that the parasite can infect all species of domesticated livestock, although the principle host varies geographically (Indrakamhang, 1998; El-Sawalhy and Seed, 1999; Al-Rawashdeh *et al.*, 2000).
In addition to the name surra, other names such as 'murrina', 'mal de caderas' or 'derrengadera' are used to describe similar diseases caused by trypanosomes indistinguishable from *Trypanosoma evansi* in South America. The collective name American surra has since been proposed for adoption in South America due to the need to maintain uniformity in nomenclature (Losos, 1980; Luckins, 1998).
*Trypanosoma. evansi* is one of the major and most important diseases in camels in the arid and semiarid zone of the world (Boid, *et al.*, 1985)
In Africa, beyond the northernmost limits of the tsetse fly belt, and in parts of East Africa, camels are the most important host (Dia *et al.*, 1997).
The disease has wide distribution in areas of Africa, Middle East, Asia and central and South America (Radostits *et al*., 2000). *Trypanosoma evansi* was diagnosed for the first time in Iran in 1932 (Rafiee, 1979). Surra has been reported in Pakistan (Hasan *et al*., 2006), Southern Ethiopia (Pregram and Scott, 1976), Mali (Diall *et al*., 1993), Jordan (Abo-Shehada *et al*., 1999), Chad

(Delafosse and Doutoum, 2004), Kenya (Njiru *et al*., 2004), Mauritania (Jacquiet *et al*., 1994), Somalia (Dirie *et al*., 1989).

**Etiology**

*Trypanosoma evansi* is a species belonging to the subgenus Trypanozoon and is the causative agent of camel trypanosomosis. It is hypothesized that *Trypanosoma evansi* originated from *Trypanosoma brucei* by adaptation to a non cyclical mode of transmission and loss of ability to undergo growth and differentiation in the fly vector (Luckins, 1998). Camels that came into contact with tsetse flies acquired infections, and when such camels moved to non-tsetse areas, transmission was spread by other haematophagous flies. Other species of trypanosomes, e.g. *Trypanosoma congolense*, *Trypanosoma brucei* and *Trypanosoma vivax* have also been isolated from camels in Sudan, but their role in camel trypanosomosis is insignificant (Mahmoud and Gray, 1980; Elamin *et al.*, 1999).

**Clinical signs:**

Trypanosomosis due to *T.evansi* is a chronic wasting disease characterized by intermittent fever (38.5 – 40.1oC), anemia, fluctuating parasitaemia, emaciation, weakness with paler mucous membrane and dry scruffy coat (Syakalima, 1992). The animal stands with its nose somewhat depressed and head hanging forward. The eyes turn dull and half closed with considerable amount of tears (Karram *et al*., 1991). In addition it was observed that 100% of infected camels stared at the sun (Abo-Shehada *et al.*1999)

Also superficial lymph nodes may be enlarged ,corneal opacity with blindness , edema on the limbs, under the thorax and abdomen and pregnant she-camel may aborted (Hosein, 2012)

**The vector**

*Trypanosoma evansi* lacks the genes necessary for mitochondrial development (Gibson et al., 1983; Borst et al., 1987; Songa et al., 1990) and is therefore unable to undergo growth and differentiation in the insect vector.

It is speculated that the widespread occurrence of *Trypanosoma evansi* is largely due to its being spread mechanically by the bites of haematophagous flies, e.g. Tabanus. Stable flies (Stomoxys) have also been incriminated, but based on experimental transmission between horses, guinea pigs, and dogs, they do not appear to be important vectors (Losos, 1980).

The present study is designed to study efficacy of the Quinapyramine salts, namely Trypan and Diminazine aceturate namely Berenil as a treatment to camels naturally infected with *Trypanosoma evansi* in Azerer area at western *Libya.*

## MATERIALS AND METHODS

A total of forty camels naturally- infected with *Trypanosoma evans*i were divided into two groups. There were twenty camels in each group.

**The infected camels were Diagnosed as follow**

**1-From clinical signs**

the infected camels showed these clinical signs: anemia, emaciation, weakness with paler mucous membrane and dry scruffy coat (Syakalima, 1992). The animal stands with its nose somewhat depressed and head hanging forward. The eyes turn dull and half closed with considerable amount of tears (Karram *et al*., 1991). (edema at legs, abdomen , udder ,neck ) bi-lateral corneal opacity

**2- Laboratory diagnosis**

Blood samples have been carefully taken after animal immobilization. These samples were easily drawn from ear vein .Disposable sterile syringes have been used after disinfection of the site of blood sampling.

**Diagnosis of *T. evansi***

**Direct parasitological methods**

**1. Wet blood smears preparation:**

Wet blood films were prepared by aseptic puncture of peripheral ear veins of camels using sterile needle. A drop of blood was then taken on to a clean glass slide, and covered with cover slip before examination for *T. evansi* under compound light microscope at X400 magnification. Examination of fresh blood taken between a slid and a cover slip.

Trypanosomes can be detected moving and lashing with flagellum between the blood cells *(Hosein*, 2012*)*

**2. Dry blood sm**ears preparation:

For identification of the causative trypanosome (*T. evansi*.), simultaneous dry blood films were taken from the ear vein.

Thin blood smears were prepared, air-dried, fixed in absolute methanol, stained with Giemsa stain and examined microscopically for blood parasites with light microscopy (×40 and oil immersion objectives) according to Hoare, 1972.

Laboratory diagnosis were carried out before and after administration of Chemotherapy.

**Chemotherapy**

The first group treated with Typan Product of Arab Veterinary Industrial (AVICO) Amman-Jordan. Composition; Quinapyramine sulphate 1.5 g Quinapyramine chloride 1g at a dose of 7.4mg/kg weight subcutaneously (Finelle, 1973). While the second group treated with Berenil (Diminazene aceturate) (Hoechst, Germany) at a dose of 3.5 mg/kg weight subcutaneously (Leach, 1961; Fazil, 1977; Homeida *et al*, 1981).

**Trypan**

is the principal drug in the quinapyramine compounds group, which is curative against *T.evansi* in all species of hosts (Finelle, 1973) and additionally gives camels a prophylactic protection for three to four months (Njogu**,** 1986). It is administrated subcutaneously.

**Berenil (Diminazene aceturate) (Hoechst, Germany)**

This drug qualifies as a wide spectrum trypanocidal drug (Losos, 1986). The drug is notable among anti-trypanosomal drugs in being rapidly excreted from the body, mainly through urine (Kellner *et al*, 1985) and is therefore not considered to have pronounced prophylactic activity (Fairclough, 1963; Williamson, 1970).

## RESULTS AND DISCUSSION

After injection of the trypan subcutaneously at a dose rate of 7.4mg/kg s.c. (Finelle, 1973) to the first main group, which composed of twenty naturally infected camels showed disappearance of all clinical singe after a single injection and Blood smears after treatment showed no parasite and all the affected camels recovered(fig 1). Similar results were reported by (Finelle, 1973) trypan {a mixture of quinapyramine sulphate (3 parts) and quinapyramine chloride (2 parts)} which was made up in the water and administrated at a dose of 7.4mg/kg.s.c. This gave two months of protection for camels against *T. evansi* and relapses were treated with suramin and additionally gives camels prophylactic protection for three to four months (Njogu**,** 1986). The main disadvantage of quinapyramine compounds is cost, as it is more expensive than suramin. (Finelle, 1973)

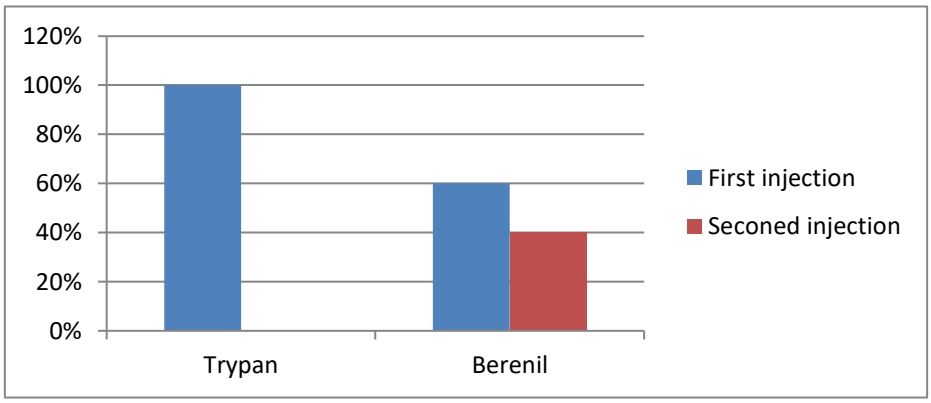


**Figure 1: Show the percentage of recovery of infected camels after their injected with Trypan and Berenil**

About Berenil, which was injected to the second main group at dose of 3.5 mg/kg ,the twelve camels naturally- infected with *Trypanosoma evans*i were recovered(fig 1) after first dose and Blood smears after

treatment of the twelfth camels showed no parasite ,while Blood smears of eight camels showed the presence of the parasite ,so were needed other injection (fig 1) .After the second injection the eighth camels were recovered and Blood smears showed no parasite. This result agreement with (Losos, 1986). (Kellner *et al*, 1985) (Fairclough, 1963; Williamson, 1970). this result on the same line with (ALAmin *et al*, 1982) who reported; Trypanocides used in treatment and protection are the most common single method employed for the control of camel trypanosomosis, both curative and preventive as in the case of the quinapyramine compounds (Losos, 1986).

It was noted in this study that animals treated with trypan were recovered after the first dose ,but animals which treated with Berenil needed other dose .So, efficacy of Trypan (the Quinapyramine salts), as a treatment of camels naturally infected with of *Trypanosoma evansi* more stronger than Berenil( Diminazine aceturate) as a treatment of camels naturally infected with *Trypanosoma evansi*.

**Conclusion**

In conclusion, the results of the present study indicate that Trypan was more efficient than Berenil when was used for treatment *Trypanosoma evans*i infection in camels.

**REFERENCES**

**Abo-Shehada, M. N., Anshassi, H., Mustafa, G., & Amr, Z. (1999).** Prevalence of Surra among camels and horses in Jordan. *Preventive veterinary medicine*, *38*(4) 289-293.

**Al-Rawashdeh, O. F., Sharif, L. A., Al-Qudah, K., & Al-Ani, F. K. (1999).** *Trypanosoma evansi* infection in camels in Jordan. *Revue D Elevage Et De Medicine Veterinaire Des Pays Tropicaux*, *52*(3/4), 233-238.

**Boid, R., Jones, T. W., and Luckins, A. G. (1985).** 3. Protozoal diseases of camels. *British Veterinary Journal*, *141*(1), 87-105.

**Borst, P., Fase-Fowler, F., and Gibson, W. C. (1987).** Kinetoplast DNA of *Trypanosoma evansi*. *Molecular and biochemical parasitology*, *23*(1) 31-38.

**Delafosse, A., & Doutoum, A. A. (2004).** Prevalence of Trypanosoma evansi infection and associated risk factors in camels in eastern Chad. *Veterinary parasitology*, *119*(2-3), 155-164.

**Dia, M. L, Diop, C, Aminetou, M, Jacquiet, P, & Thiam, A. (1997).** Some factors afecting the prevalence of *Trypanosoma evansi* in camels in Mauritania. Veterinary Parasitology; 72 (2)111-120..

**Diall, O., Bocoum, Z., Diarra, B., Sanogo, Y., Coulibaly, Z., & Waigalo, Y. (1993).** Epidemiology of trypanosomiasis caused by T. evansi in camels in mali: results of parasitological and clinical survey. *Revue D'elevage et de Medecine Veterinaire des Pays Tropicaux*, *46*(3): 455-461.

**Dirie, M.F., K.R. Wallbanks, A.A. Aden, S. Bornstein and M.D. Ibrahim, (1989).** Camel*Trypanosomiasis* and its vectors in Somalia. *Veterinary parasitology*, **32** 285-291.

**Egbe-Nwiyi, T. N., & Chaudhry, S. U. R. (1994).** Trypanosomosis: Prevalence and pathology of camel of arid zone of north eastern Nigeria. *Tropical Veterinary*. 20: 30-34.

**El Sawalhy, A., & Seed, J. R. (1998).** Diagnosis of trypanosomiasis in experimental mice and field-infected camels by detection of antibody to trypanosome tyrosine aminotransferase. *The Journal of parasitology*, 40: 1245-1249.

**Elamin, E. A., El Bashir, M. O. A., & Saeed, E. M. A. (1998).** Prevalence and infection pattern of Trypanosoma evansi in camels in mid-eastern Sudan. *Tropical Animal Health and Production*, *30*, 107-114.

**Fairclough, R. (1963).** Observations on use of berenil against trypanosomiasis of cattle in Kenya. *Veterinary Record*.. 75: 1107.

**Fazil, M.A. (1977).** The camel. *Bulletin of Animal Health and Production in Africa*, 25 (4) 435-442.

**Finelle, P., (1973).** African animal trypanosomiasis part 11 chemoprophylaxis and the rising of trypanotolerant livestock. *World Animal Review*. 8 24-27.

**Gibson, W. C., Wilson, A. J., & Moloo, S. K. (1983).** Characterisation of *Trypanosoma (Trypanozoon) evansi* from camels in Kenya using isoenzyme electrophoresis. *Research in veterinary science*, *34*(1) 114-118.

**Hasan, M. U., Muhammad, G., Gutierrez, C., Iqbal, Z., Shakoor, A., and Jabbar, A. (2006).** Prevalence of *Trypanosoma evansi* infection in equines and camels in the Punjab region, Pakistan. *Annals of the New York Academy of Sciences*, *1081*(1), 322-324.

**Hoare, C.A. (1972).** HoareThe trypanosomes of mammals A Zoological Monograph, Blackwell Scientific Publications, Oxford, UK, 1-749.

**Homeida, A. M., El Amin, E. A., Adam, S. E. I., and Mahmoud, M. M. (1981).** Toxicity of diminazene aceturate (Berenil) to camels. *Journal of Comparative Pathology*, 91(3) 355-360.

**Hosein H.I. (**2012). Infectios disease of Domestic animals , second edition. *Lazer center for puplication and distribution Beni-Suef .Egypt* P335

**Indrakamhang, P. (1998).** *Trypanosoma evansi* infection in livestock in Thailand. *The Journal of Protozoology Research*, *8*(3): 153-161.

**Jacquiet, P., Dia M.L., Cheikh D. and Thiam A., (1994)**. Camel *Trypanosomiasis* caused by *Trypanosoma evansi* (Steel 1885), Balbiani 1888, in islamic republic of mauritania: Results of surveys in the Trarza region. *Revue d'élevage et de médecine vétérinaire des pays tropicaux*, 47: 59-62.

**Karram, M. H., Ibrahim, H., ALI, T. S. A., & Manaa, A. M. (1991).** Clinical and haematological changes in camel infested with Trypanosoma evansi and microfilaria. *Assiut Veterinary Medical Journal*, *25*(49), 118-128.

**Kellner, H. G. Echert, M. H. and Volz, M. H. (1985)** Studies in cattle on the disposition of the antitrypanosomal drug diminazene aceturate (Berenil) *Tropical medicine and parasitology* , 36, 199.

**Leach, T. M. (1961).** Observations on the treatment of *Trypanosoma evansi* infection in camels. *Journal of Comparative Pathology*, *71* 109-117.

**Losos, G. J. (1980).** Diseases caused by *Trypanosoma evansi*, a review. *Veterinary Research Communications*, *4* 165-181.

**Luckins .A .G, (1988).** *Trypanosoma evansi* in Asia. Parasitol. Today, 4 137-142.

**Mahmoud, M. M, and Gray A. R., (1980).** Trypanosomiasis due to *Trypanosoma evansi* (steel, 1885) Balbiani, A review of recent research. *Tropical Animal Health and Production,*, 12, 35-47.

**Ngeranwa, J. J. N., Gathumbi, P. K., Mutiga, E. R., and Agumbah, G. J. O. (1993).** Pathogenesis of Trypanosoma (brucei) evansi in small east African goats. *Research in Veterinary Science*, *54*(3) 283-289.

**Njiru, Z. K., Brett, B., Ole-Mapeny, I. M., Githiori, J. B., and Ndung'u, J. M. (2002).** Trypanosomosis and helminthosis in camels: comparison of ranch and traditional camel management systems in Kenya. *Journal of Camel Practice and Research*, *9*(1) 67-71.

**Njiru, Z. K., Constantine, C. C., Ndung'u, J. M., Robertson, I., Okaye, S., Thompson, R. C. A., & Reid, S. A. (2004).** Detection of Trypanosoma evansi in camels using PCR and CATT/T. evansi tests in Kenya. *Veterinary parasitology*, *124*(3-4), 187-199.

**Pacholek, X., Gamatie, D., Franck, S. V., & Tibayrenc, R. (2000).** Prevalence of *Trypanosoma evansi* trypanosomiasis in young camels in West Niger. *Revue d'élevage et de médecine vétérinaire des pays tropicaux*, *53*(2) 177-182.

**Pegram, R. G., and Scott, J. M. (1976).** The prevalence and diagnosis of Trypanosoma evansi infection in camels in southern Ethiopia. *Tropical animal health and production*, *8*, 20-27.

**Radostits, O. M., Gay, C. C., Hinchcliff, K. W., Constable, P. D., Jacobs, D. E., Ikede, B. O., ... and Bildfell, R. J. (2000).** Veterinary medicine: a textbook of the diseases of cattle, sheep, pigs, goats and horses. . 9th Edn., WB Saunders, London, Pages: 1877.

**Rafiee, A. (1979)**. Comparative Veterinary Protozology. 1st Edn., Research Council Press of Ministry of Sciences and Technology, Iran.

**Songa, E. B., Paindavoine, P., Wittouck, E., Viseshakul, N., Muldermans, S., Steinert, M., & Hamers, R. (1990).** Evidence for kinetoplast and nuclear DNA homogeneity in *Trypanosoma evansi* isolates. *Molecular and biochemical parasitology*, *43*(2) 167-179.

**Syakalima, M. (1992).** Studies of cymelarsan therapy on *Trypanosoma evansi* and *Ttrypanosoma equipirdum*. Center for tropical veterinary medicine (CTVM), *Annual report*, P. 22-23.

**Williamson, J. (1970).** Review of chemotherapeutic and chemoprophylactic agents. In the African trypanosomiasis, Mulligan, H. Wed., Allen and UN win, London pp, 125.