Communication

Efficacy of Cymelarsan® in the treatment of natural chronic *Trypanosoma evansi* infection in camels in the Sudan

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Les auteurs ont testé dans les conditions de contrôle en laboratoire, l'efficacité du Cymelarsan® administré par voie intramusculaire (i.m.), dans le traitement des cas chroniques de trypanosomose cameline naturelle à *Trypanosoma evansi*. Il est confirmé que le Cymelarsan® administré par voie intramusculaire à des doses de 0,25 ou 0,50 mg/kg de poids vif est un médicament sûr pour le dromadaire. Pendant les 90 jours qui ont suivi le traitement, aucune rechute n'a été observée, avec l'une ou l'autre posologie. Ce médicament est donc pleinement efficace contre les formes chroniques de la maladie naturelle et la dose de 0,25 mg/kg de poids vif en i.m. est recommandée.

Mots clés : Dromadaire - Trypanosomose - *Trypanosma evansi* - Trypanocide - Sang - Gain de poids - Soudan.

Introduction

Cymelarsan®* is a new injectable, trivalent organic arsenical developed for the treatment of animals with trypanosomosis of the *Trypanosoma brucei* group (5). It has been shown to be very effective against acute *T. evansi* infection in dromedary camels (6, 8).

The authors have already tested the product against chronic *T. evansi* infection in camels maintained under field conditions in the Eastern Sudan (3). Despite the abnormally long and severe dry season experienced during the trial, Cymelarsan® was found to be very effective. However, a few relapses, or possibly re-infections, occurred from 32 days post-treatment.

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The present study is a further investigation of the efficacy of Cymelarsan® in camels in the Sudan. The main objective was to determine the origin of the trypanosomes detected after treatment in the first trial, by keeping naturally infected camels under fly-proof conditions after treatment, to exclude any possibility of re-infection.

Materials and Methods

Source of naturally infected camels

Twenty camels naturally infected with *T. evansi* were purchased from herds and camel markets in the vicinity of El-Gedaref (200 km from Kassala), Eastern Sudan. Purchase selection was made on the basis of detection of motile trypanosomes in these animals using the buffy coat examination technique (BCT), and further confirmation as *T. evansi* by mice inoculation and examination of Giemsa-stained blood smears. Purchased camels were transported by lorry to the Regional Veterinary Research Laboratory at Kassala, where this work was conducted.

Pre-treatment examinations and preparations

In the laboratory, 2-3 weeks before treatment, each animal was subjected to routine clinical examinations and regular check-ups for parasitaemia. Jugular vein blood was collected from each animal at weekly intervals for assessment of haematological parameters. Serum samples were also collected for further serological examination. Faecal samples were examined for helminth parasites and Ivomec® (MSD Agvet) was used for clearance of helminth infestation. All animals were sprayed with Gamatox® (MallincKrodt Veterinary) to clear tick infestation.

These camels were fed *ad libitum* on *Sorghum vulgaris* (Durra) and hay. Water was provided every 2 days. Three days before treatment commenced, the camels were individually weighed. Before treatment with Cymelarsan® the 20 camels were divided into 3 groups as shown in table I.

***TABLE I** Trypanosomosis-infected camels as grouped for the treatment with Cymelarsan®.*

Group	No. of camels	Drug & Dosage rate (mg/kg body weight)	Average body weight (kg)	Route of administration
I	8	Cymelarsan® (0.25)	360.6	IM
II	8	Cymelarsan® (0.50)	418.7	IM
III	4	untreated control	364.0	—

IM : intramuscular.

Four animals in group III were left as infected, untreated controls for 47 days before being treated with quinapyramine (Trypacide®, Rhône Mérieux) at a dose of 4.0 mg/kg body weight by the subcutaneous (s/c) injection and monitored for 43 days. Therefore, group III is designated untreated controls (group IIIa) for the first 47 days, then Trypacide® treated group (group IIIb) for the remainder of the trial.

Post-treatment examinations

During treatment with Cymelarsan® and Trypacide®, the immediate systemic reactions were recorded on a video tape and the general health condition was authenticated by photography. Immediately after this, the camels were transferred to fly-proof accommodation 90 days. Twelve hours post-treatment with Cymelarsan®, the treated camels were examined for motile trypanosomes by BCT, and examined once every other day for the first week. Thereafter, the camels were examined 2-3 times a week for 11 weeks. Jugular vein blood was collected once every two weeks for haematology. At the end of the experiment, 90 days post-treatment, the camels were released and weighed.

Results

Pre-treatment observations (table II).

Seventeen of the 20 purchased camels were females of age range 7-12 years. Eight of these females were 5-9 months pregnant. Three were male aged 3-7 years. Eighteen out of the 20 camels were in poor condition. The clinical signs of debility, general weakness, loss of appetite, lacrimation, oedema of the limbs and loss of hair indicated chronic trypanosomosis. Using the BCT, trypanosomes were detectable in all the camels before treatment commenced. Parasitaemia was persistent in most of them and frequently disappeared from the others.

Post-treatment observations

Immediate reaction of camels to Cymelarsan® and Trypacide®

Camels treated with Cymelarsan® tolerated the drug well, showing little reaction at either dose level. Only one camel, which was pneumonic, showed signs of respiratory distress with lateral recumbency and an inability to stand. This effect continued for about 15-20 minutes, after which the camel returned to normal. There was no adverse effect on pregnant females. The response to Trypacide® was the classical signs of salivation, urination and restlessness which lasted for a period of more than two hours.

The effect of Cymelarsan® on trypanosomes in blood circulation (table III)

Examination of blood from all the Cymelarsan®-treated camels after 12 h revealed no detectable circulating trypanosomes. The animals treated with Trypacide® were investigated after 3 days and one camel remained positive. This camel was then re-treated using Cymelarsan® at a dose rate of 0.5 mg/kg body weight. The trypanosomes then disappeared completely from the circulation until the end of the experiment. The examination of Cymelarsan®-treated camels 90 days post-treatment revealed no detectable trypanosomes (table II). Hence, Cymelarsan® successfully cleared the parasite at both dose levels (0.25 and 0.50 mg/kg body weight).

Table III summarizes the haematological values from the pre- and post-treatment period. The camels under trial were initially at an advanced stage of anaemia, shown by low PCV values (minimum 18.1 % group III, standard 30-35 %) and RBC counts (minimum 4.01×10^6/mm^3 group II, standard $5.0\text{-}10.0 \times 10^6$/mm^3) (2, 7). Over the post-treatment period, some improvement in the PCV values and RBC counts were noted, indicating recovery from anaemia.

TABLE II Pattern of **T. evansi** *parasitaemia in camels before and after treatment, monitored by buffy coat examination technique.*

Group	No. of camels	Pre-treatment examination results	Drug & Dose (mg/kg body weight)	Post-treatment examinations			
				30 days	60 days	90 days	Totals
I	8	26/64/(14)[a] 8/16/(2)	Cymelarsan® (0.25)	0/96	0/64	0/64	0/224/(90)
II	8	26/64/(14) 8/26/(2)	Cymelarsan® (0.50)	0/96	0/64	0/64	0/224/(90)
III	4	8/85/(47)	Trypacide® (4.00)	1/8	1/32	—	2/40/(43)

[a] *No. of positive examinations/Total No. of examinations/(days).*

TABLEAU III The mean haematological values of chronically **T. evansi** *infected camels before and after treatment with Cymelarsan® and Trypacide®.*

Group	No. of camels	Pre-treatment values				Post-treatment values											
						30 days				60 days				90 days			
		PCV (%)	Hb (g/ 100 ml)	RBC ($\times 10^6$/ mm^3)	WBC ($\times 10^3$/ mm^3)	PCV (%)	Hb (g/ 100ml)	RBC ($\times 10^6$/ mm^3)	WBC ($\times 10^3$/ mm^3)	PCV (%)	Hb (g/ 100 ml)	RBC ($\times 10^6$/ mm^3)	WBC ($\times 10^3$/ mm^3)	PCV (%)	Hb (g/ 100 ml)	RBC ($\times 10^6$/ mm^3)	WBC ($\times 10^3$/ mm^3)
I	8	21.4	9.44	4.35	19.83	22.51	9.30	4.65	18.60	22.51	9.91	6.22	18.28	22.3	8.60	5.91	17.75
II	8	19.8	9.22	4.01	17.65	19.51	8.98	3.79	17.94	22.03	8.96	5.96	17.46	21.1	8.45	5.84	17.56
III (a)*	4	18.1	7.28	5.10	17.40	18.6	ND	ND	ND								
III (b)**										18.10	7.28	5.10	17.40	17.1	7.45	4.90	17.98

ND = not done.
* *This group kept as infected, untreated control for 47 days.*
** The same group treated with Trypacide® on day 48 and examined for 43 days.

TABLE IV Average weight gain of **T. evansi** *infected camels 90 days after treatment with Cymelarsan® and 43 days after treatment with Trypacide®.*

Drug and dosage (mg/kg body weight)	No. of of camels	Average body weight before treatment (kg)	Average body weight after treatment (kg)	Average weight gain (kg)	% weight gain
Cymelarsan® (0.25)	8	360.6	397.8	37.2	10.32
Cymelarsan® (0.50)	7*	420.0	444.3	24.3	5.78
Cymelarsan® Total	15	388.3	419.5	31.2	8.03
Trypacide® (4.0)	4	364.0	368.0	4.0	1.10

* *One of the 8 camels died after the end of the trial with twisting neck disease.*

General body condition and weight

There was a marked improvement in the general body condition which started from the one week after treatment. The most prominent signs of improvement were the disappearance of oedema of the limbs, cessation of lacrimation and growth of new hair. The average body weight increased by 8.03 % in all the camels under Cymelarsan® treatment. In animals treated with Trypacide®, it increased by 1.10 % over a period of one month and a half (table IV). They showed a similar pattern of improvement in condition to that observed in the Cymelarsan® group.

Discussion

The results of the present study show that intramuscular administration of Cymelarsan® produces no local reaction, although an insignificant immediate and transient systemic reaction was observed in a single pneumonic camel. In contrast, subcutaneous administration of the drug (3) produced a hard fibrous swelling felt by palpation of the injection site of treated camels. The present work also show that Cymelarsan® was capable of clearing trypanosomes from the blood circulation of chronically infected camels within a few hours. This was indicated by the rapid improvement in general health performance observed post-treatment.

It has been well documented that Cymelarsan® has full activity against the acute form of trypanosomosis due to *T. evansi* in camels (5, 6, 8). The same finding was observed in this study when chronically infected camels were treated with Cymelarsan®. These results also suggest that in previous work (3), the detection of circulating trypanosomes 32-60 days post-treatment with Cymelarsan® was due to re-infection. Although the regular provision of water, food, rest and shelter contributed to the complete recovery of the chronically infected camels, the significant increase in body weight (8.03 %) and the good general condition attained in Cymelarsan®-treated camels at the end of the trial, can be attributed to the efficacy of the drug.

Conclusion

Cymelarsan® is a safe drug for use in camels and is fully effective against the chronic form of camel trypanosomosis caused by *T. evansi* when administered by i/m injection at a dose rate of 0.25-0.50 mg/kg body weight. A dose of 0.25 mg is recommended.

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MUSA (M.M.), ABDOON (A.M.O.), NASIR (B.T.), SALIM (Y.I.), ABDEL-RAHMAN (A.Y.), SHOMMEIN (A.M.). Efficacy of Cymelarsan® in the treatment of natural chronic *Trypanosoma evansi* infection in camels in the Sudan. *Revue Élev. Méd. vét. Pays trop.*, 1994, **47** (4): 397-400

The efficacy of Cymelarsan®, administered by intramuscular (i/m) injection in the treatment of chronic cases of camel trypanosomosis due to *Trypanosoma evansi*, was tested under controlled laboratory conditions. It was confirmed that Cymelarsan® is a safe drug for use in dromedary camels when administered i/m at dose rates of 0.25 or 0.50 mg/kg body weight. During the 90 days post-treatment no relapses occurred at either dose rate. Hence, the drug was found to be fully effective against the chronic form of the natural disease. A dose of 0.25 mg/kg body weight of Cymelarsan® given i/m is recommended.

Key words : Dromedary - Trypanosomosis - *Trypanosma evansi* -Trypanocidal - Blood - Weight gain -The Sudan.