Trypanosomosis in animals: A disease of concern

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INTRODUCTION

Trypanosomosis caused by *Trypanosona evansi* is an important haemoprotozoan disease of domesticated animals, pets and wild animals. It is commonly termed as Surra in all animal species and Tibersa in camels. Among the several species of trypanosomes, *Trypanosoma evansi* is the most commonly occurring species in India causing the disease. For non-prevalence other species, non-availability of the vector is the main cause. Surra disease results in anaemia, lowering down of milk yield and working capacity. Hence besides causing economic losses, it also causes high mortality in valuable animals. The present review deals with the overall aspects of trypanosomosis with emphasis on its treatment and control.

Epidemiology

Surra is a five component system including hosts, protozoa, environment, vector and reservoir. In a country like India and state like Maharashtra, where all the factors are conducive for the disease and therefore it results in recording of endemic foci and sporadic cases of the disease. Though our system of recording is poorly developed still fair number of cases of trypanosomosis is getting reported. The livestock all over India particularly Rajasthan, Haryana, Punjab, Madhya Pradesh, Uttar Pradesh, Maharashtra, Tamil Nadu, Kerala, Andhra Pradesh is prone to disease. It occurs...
in all age groups of hosts. Most suitable season for occurrence of disease is during or after one and half to two months of rains due to availability of rain water lodged ditches for breeding of the flies.

**Transmission of the disease**

Trypanosomes are mechanically transmitted by blood sucking flies chiefly *Tabanus*, *Hamatopota*, *Stomoxys* and *Lyperosia*. Former three species are very fond of light and they bite to their host during bright sunshine hours, whereas later fourth species can bite in shaded areas.

**Role of tabanid flies**

The parasite in the vector survives for very brief period and therefore the tabanid flies forms the most suitable for transmission due to their interrupted feeding habit. *Tabanus* flies replete the blood meal on different host within 15 minutes time. This particular habit of flies, makes the way easier for parasite to get transmitted from one host to another.

**Role of host**

Trypanosomes has wide host range and several wild or domestic animals carry latent infection and acts as source of infection. Cattle and buffaloes are considered as reservoir of parasite for camels and horses. However, recent experience of disease suggests that buffaloes and cattle suffers from acute disease besides acting as reservoirs.

**Pathogenesis:** is caused in following ways

1. Sugar consumption: Trypanosomes consumes large quantity of blood sugar resulting in breakdown of the liver function and the resultant hypoglycaemia and fetal intoxication. Trypanosome causes disturbances of carbohydrate metabolism leads to
hypoglycaemia, which are attributed to malfunctions of adrenals, pancreas and thyroid glands due to direct utilization of glucose by parasites¹⁷. Due to disturbances in protein metabolism alternation in globulins in the blood serum indicating humoral response.

2. Anaemia: Trypanosomes liberate toxins or proteolytic enzymes which results in the formation of toxins which leads to severe anaemia and death¹³. There is hyperkalemia due to release of potassium results in destruction of erythrocytes¹⁰.

3. Nervous disorders: In acute cases the nervous signs are exhibited by the animals.

4. Tryptophol mechanisms: Tryptophane metabolized to tryptophol in the physiological ways. However, the trypanosome brought about these changes leads into the excess tryptophol in blood results into lethargy. Such excess tryptophol being immediately eliminated from the body after the chemotherapy²¹.

**Clinical symptoms**

**Cattle and buffaloes**: Disease can be observed as symptomless to peracute form. Incubation period is exactly not known. Depending upon severity of the disease the peracute, acute, subacute and chronic forms are observed which is mainly depend on strain of the parasite involed ¹⁷. Important symptoms observed in acute form as intermittent rise in temperature 39.4 to 41°C, redness and staring of eyes with continuous flow of lacrimation, sudden drop in milk yield¹³, deep and prolonged breathing creating noise, nervous symptoms such as circling movement or beating head to mangers, shivering of muscles, coma, collapse and death. In peracute cases death within 2-3 hrs.

Subacute or chronic form: dullness, lacrymation, intermittent rise in temperature, oedema of some parts of body and legs. Abortion may occur. Mortality may reach upto 20-90 percent⁴.
Equines: The disease is fetal. Incubation period is 4-9 days. Emaciation and edema of lower part of the body and legs with urticarial plaques on the neck and flank. Mortality rate may reach to 100 per cent. An intermittent fever when parasites are not in blood and high rise in temperature when parasites are in blood are prominent symptoms. Progressive loss of weight, pale conjunctivae and oedema of limbs has been reported in kathwari mare.

Camels: Incubation period is 1 to 3 weeks. Weakness during rising under load, loss of brightness of eyes are few prominent symptoms. The recording of morning temperature can only give the clue about the disease. Oedema of legs, anemia, emaciation also reported. All age groups are equally prone to disease, but higher prevalence of disease occurs in growing animals.

Dogs: It is more occurred in imported and delicate breeds of dogs. IP 5-10 days. Marked fever, anorexia, anaemia, staggering gait, oedema of throat (Changes the voice), opacity of cornea are the prominent symptoms which may sometimes matches rabies.

Sheep and goats: Disease occupies position midway between horses and cattle/buffaloes. Emaciation, anaemia, loss of appetite and severe form of disease result in fetal. High ever (105°F ), muscle twitching, salivation is reported in bucks.

Elephant: Disease is severe and follow a course similar to camels. Intermittent fever, dullness, disinclination to move and oedema of face and dependent parts.

Diagnosis: Early diagnosis of disease helps in undertaking chemophylaxis and saving of the valuable animals. Hence, it carry immense importance. Diagnosis can be done at two level.
At field level: can be done by Veterinary Officer

In the dispensary the diagnosis of advance cases can be done easily by blood smear examination.

a) Wet blood film

Take a drop of recently collected blood on the slide, add cover glass and observe under microscope. Movement of trypanosomes can be easily seen but the diagnosis should be done within 15 minutes time after blood collection, is also called Hanging drop method.¹

b) Thick / thin blood smear

Blood smear collected from the affected animal, stain with Giemsa stain and observed under microscope (oil immersion objective).

For both the methods blood should be collected at height of temperature.

At laboratory level

Recently advance immunological techniques are developed which give diagnosis with highest accuracy. Chronic cases can be very well detected. At the onset of monsoon following situation should be taken in to consideration and samples should be sent to laboratory for early diagnosis:

a) History: The area is declared as endemic for trypanosome.

b) Fly population: Swarms of flies observed on the body of animals.

To observe the *Tabanus* flies on animal body, observation should be made when animals are grazing in bright sunshine, in shady areas no flies can be detected.

In the laboratory the recent techniques developed are:—

a) Blood inoculation in mice, rats, rabbits, Guinea pigs and observe the parasitaemia in these animals.
b) Serological tests:
   i) Latex agglutination test
   ii) Immunofluorescence test
   iii) Double diffusion and card agglutination test
   iv) Polymerase chain reaction PCR
   v) Double antibody Sandwich assay
   vi) ELISA

Immunology

Unique antigenic variation displayed by the trypanosome by expressing a various surface glycoprotein (VSG) are the sole responsible for failure of every attempt in developing the vaccine against the disease. However, using the same VSGs scientists are making efforts for preparation of vaccine. But as on today no vaccine is available against this disease and hence one has to rely on chemoprophylaxis, fly control and early diagnosis with effective treatment.

Treatment

Following are the effective treatment available against the disease.

1. **Diminazine aceturate:** It acts as trypanocidal and should be given @ 0.8 – 1.6 g/100 kg BW I/M. The drug can be used as curative successfully. However, it has no prophylactic effect against the disease. The drug is well tolerated in bovines, ovines, caprines, but it less well tolerated by equines while in dogs and camels general reaction may occur.

2. **Suramin:** It also shows potential trypanocidal activity and can be used as curative drug in the resistant trypanosomes. Suramin is the drug of choice in camels in which it is well tolerated as I/V @ 1-2 g/100 kg BW. The suramin and quinapyramine dimethyl sulphate are the drug to be used in resistance/relapse strains.
3. **Quinapyramine**: It is available in two drug forms.

1. Quinapyramine chloride: Slowly released in the blood and acts as chemoprophylactic.

2. Quinaphyramine methyl sulphate: Reaches the therapeutic levels in blood quickly after injection and used as therapeutic drug.

Combination of these two are called as prosalt in the proportion of 1:1.5 (2.5 g + 15 ml water dose 2.5 ml/100 kg BW). The drug is well tolerated by equines, bovines and camels although local reaction may occur in horses.

Available trypanocidal drugs manufactured by various firms*

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<tr>
<th>Sr. No.</th>
<th>Name of the drug</th>
<th>Trade name</th>
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<tbody>
<tr>
<td>1.</td>
<td>Suramin</td>
<td>Naganol</td>
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<td>2.</td>
<td>Diminazene aceturate</td>
<td>a) Berenil</td>
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<td>b) Dimaze</td>
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<td>f) Trityl</td>
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<td>3.</td>
<td>Quinpyramine prosalt sulphate + Quinpyramine chloride in the proportion of 1.5 g + 1 g</td>
<td>a) Antrycide</td>
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<td>b) Corridan</td>
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<td>c) Tivansi</td>
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<td>d) Triquin</td>
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*Cinvex 2004-05, 4:155-156."
Control: The control of trypanosomosis needs three way approach.

1. Treatment of affected animals.

2. Chemoprophylaxis of animals at disease risk

3. Fly control

   The chief fly species responsible for transmission is *Tabanus* followed by *Stomoxys, Haematopota* and *Lyperosia*. Before actually seeing the control measure, let us have review of their life cycle.

   In the life cycle of all flies eggs, larva, pupa and adult are the stages. All are blood suckers with few important differences regarding their breeding sites (larval habitat) which are the key points to be targeted for control.
Can complete one two cycles in a season. Lays the eggs vicinity of water. Strong fliers. Requires 4-5 months to complete life cycle

Can complete one two cycles in a season. Lays the eggs and larvae are found in wet soil. Strong fliers. Requires several months to complete life cycle

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After review the life cycle following means can be adopted.

1. **Physical control**

   a) In the animal shade regular removal of dung, moist bedding, etc.

   b) Stacking of manure in the compact heaps, it helps in creating lot of heat, which kills the larval stages of *Lyperosia* and *Stomoxys* flies.

   c) Do not let loose the animals during bright sunshine hrs. As the *Tabanus* and *Stomoxys* flies favor bright sunshine for biting
(The ideal grazing time during fly season is morning 5 to 8 hrs and evening 18 to 20 hrs).

d) Bush clearing over the ditches, water bodies, etc. It helps in reducing the breeding of flies.

e) Dung management which includes is the important step regular removal of manure, staking of manure in compact heaps and sprinkling of insecticides over manure heaps, this three step formula to be implemented.

f) Drainage around cattle shade should be cleaned very frequently.

**Chemical control**

1. *Tabanus* flies has the habit of skimming over the water body and frequently dipping in the water. Taking advantage of this, spraying of kerosene on the water body (not in running water) kills the flies.

2. Spraying/dipping of insecticide over animals during fly season.

**REFERENCES**


