

Trypanosoma equiperdum

Morphologically indistinguishable to *T. evansi* causes venereal disease of horses called **Dourine**. (an Arabic word signifies unclean / dirt) or **equine syphilis** or **breeding paralysis**. Presently not occur in India since 1920 – 21. Occur in North and South Africa, Central and South. America, middle East & Asiatic Russia.

Transmitted mechanically by coitus, rarely by biting flies & infective discharges. Foal contact infection through vaginal discharge contaminating conjunctival or nasal mucosa. All equines are susceptible but donkey and mules are resistant, Jackle act as symptom less carries of the infection. Incubation Period 2 -12 weeks or even more.

The clinical dourine occur in 3 phases

1. **Stage of Oedema** : (1st Phase)

In mare, initiated by a mucoid vaginal or urethral discharge, a degree of nymphomania & a mild fever with oedema of the genitalia. In mare, vagina mucosa is hyperaemic & ulcer may be present. In stallion, the prepuce and scrotum are swollen and the oedema may extend under the belly. Deep pigmentation of circumscribe areas of the vulva and the penis also occur. This phase last 4 – 6 weeks & mild case go unnoticed. In severe case frequent micturation & abortion in pregnant mares are seen.

2. **Urticarial Phase** (2nd Phase) :

Appear after 4 – 5 weeks of 1st Phase. Appearance of oedematous plaques under the skin, especially of the flanks but any parts of the body may be affected. The plaques are circular, circumscribe and are 2 – 10 cm. in diameter, classically referred to a '**dollar spot**' since they appear as if a silver dollar or a rupee coin has been inserted under the skin. This lesion persist for 3 – 4 hours to 3-4 days, then disappear, but may reappear again. These are Pathognomonic for the disease. Affected area may be felt by putting hand on the affected part and the area become depigmented when the swelling has resolved.

3. **Phase of paralysis** (3rd phase)

There is loss of co-ordination, unilateral paralysis affecting hind limbs, lips, nostrils and ears. Later, there is complete paralysis and recumbency followed by death. Mortality varies from 50 to 70%.

Postmortom examination : Carcass emaciated with marked muscular atrophy, oedematous infiltration of the perineal tissue and the abdominal wall. Serous infiltration occur along the large nerve trunks supplying the hind limbs.

Diagnosis : 1. Pathognomonic Symptom.
2. Detecting the organism in smear from mucous membrane of genitalia & utricularial swelling.
3. Animal inoculation with blood.

Control : 1. Slaughter the infected animal.
2. Castrated the infected animal to avoid spreading.
3. Treatment.

Trypanosoma equinum

- They are monomorphic form, No kinetoplast, flagellum arises from a small blepharoplast.
- Occurs in Central & South America.
- Causes '**Mal-de-caderas**' in horse. Mules and donkey are less susceptible.
- Transmitted by Tabanid fly mechanically.
- Usually it causes chronic infection with death occurring 2 – 6 months after infection.
- Incubation period 4 – 10 days.
- There is emaciation followed by weakness of the hind quarter (**mal-de-coderas**) resulting in staggering gait. The animal become recumbent ultimately. Symptoms like conjunctivitis, keratitis and oedema of the eye lid appear.

Postmortom examination : Splenomegaly, enlargement of lymph nodes and anaemia, petechial haemorrhage in kidney, ascitis & oedematous infiltration in spinal canal.

Diagnosis : 1. Blood smear examination.
1. Animal inoculation.

Trypanosoma Vivax

Monomorphic, 20 – 27 μm , Very motile

Occurs in cattle in west Africa, Central & South America, West Indies and Mauritius.

Transmitted by tsetse fly (*Glossina*) & also mechanically by biting fly.

Per acute infection in Cattle :

High and persistent parasitaemia occurs. Extensive haemorrhage in mucosal and Serosal surface of digestive tract, body cavity, muscle, heart and CNS. Enlargement of spleen and lymph node

Chronic Form

Anaemia, emaciation and severe wasting

Trypanosoma Congolense

Small form 9 – 18 μm , smallest of African Trypanosomes.

No free flagellum.

Undulating membrane inconspicuous.

Cause 'Nagana' (a zulu word meaning to be in low or in depressed spirit)

Host : Domestic animals & wild game animals.

Transmission : Cyclically by *Glossina* & mechanically by biting flies.

Symptom :

Cattle : Similar as in case of other Trypanosome. Acute, per acute & chronic forms occur.

Anaemia, haemorrhage in serous & mucosal surface, lymph node enlarged.

Sheep & Goat : Anaemia, weakness, emaciation.

Horse : Chronic condition occur, Anaemia, Weakness emaciation,

Trypanosoma brucei

Polymorphic and 25-35 μm in length.

Commonest and most important parasite of animal in Africa.

Transmission – by Tsetse fly and mechanically by biting fly.

They are **humoral parasite** occurring in the tissue fluid of body cavity between connective tissue and plasma.

In horse:- Intermittent fever, rapid emaciation, ocular and nasal discharge, icterus and oedema.

Paralysis occur in chronic cases.

Cattle :- Occurs extra vascularly and produce inflammatory reaction of the skin, s/c tissue, heart, CNS and eye.

Sheep :- Inflammatory reaction in heart, skeletal muscle, brain, eye, testes etc and generalized lymphoid hyperplasia.

Dog and Cat :- Fever, emaciation and oedema of the eyelids and thorax.

Trypanosoma gambiense* and *Trypanosoma rhodesiense

Both the trypanosomes cause ‘**African sleeping sickness**’. *T. gambiense* causes Gambian sleeping sickness in west coast of Africa and *T. rhodesiense* causes East African sleeping sickness of man in Zambia, Zimbabwe, Tanzania, Botswana, southern Sudan and around Lake Victoria. Transmitted by tsetse fly (*Glossina palpalis* and *G. tachinoides*) and mechanical transmission by biting flies also occur. Trypanosomes invade blood stream and then the lymph nodes and finally the CNS. There is leptomeningitis and perivascular infiltration around blood vessels. *T. rhodesiense* causes more acute disease in man than *T. gambiense*. Untreated cases may terminate in death. These spp. are having zoonotic importance. Wild and domesticated animals play an important role in the introduction of infection in clean area and carry the infection in them for long period.

Posterior station development (Stercorarian trypanosomes)

Subgenus- Schizotrypanum

Trypanosoma Cruzi

Main pathogenic species in stereoraria, causing **American human trypanosomiasis** or ‘**Chagas**’ disease in South America. In blood it is monomorphic, 16-20 µm in length & crescent shaped. Posterior end pointed. Kinetoplast large & subterminal and fills the body at that point. The nucleus is midway along the body. Moderately well developed undulating membrane & free flagellum is present. No division in trypomastigote stage & division occur in amastigote form. The dividing forms appear in muscle & other cells especially in heart muscle cells.

Geographical distribution

Human infection occur in South America & Central America, A wide variety of animals like dog, Cat, Pig, Squirrels, Monkey etc. get infected and serve as reservoir hosts.

T. cruzi is of great importance in man, chiefly affecting young children and infants. The close association of man & dog makes the latter a likely source of human infection. It has zoonotic importance.

Naturally *T. Cruzi* transmitted by blood sucking bugs of the family Reduviidae, development occur in the posterior station. Metacyclic trypanosomes are passed in the faeces of the infected bugs 8 to 10 or more days after initial infection. The human is infected when the metacyclic trypanosomes are rubbed into the wound made by the insect or into other skin abrasions or through mucous membrane. Animal may get the infection by licking the faeces of the bugs or by ingestion of the bugs. Other mode of transmission is blood transmission & transplacental from mother to foetus. In congenital infection, death of the foetus is a common sequel.

Following infection of a infected wound, metacyclic trypanosomes enter histiocytes and proliferate in the amastigote form in the local site. There is a local inflammatory response and later encapsulation by fibrous tissue. The whole, blocking the local lymphatics and producing oedema of the local area. This is the primary lesion of 'chagoma'. The amastigote pass from the primary site to local lymph nodes and then by lymphatic system to the whole body. The liver, lungs, spleen, bone marrow, cardiac muscle and brain cortex are affected. Here the organism multiply as amastigote. Large-scale rupture of cells releases trypomastigote forms into the blood and this is associate with fever. Acute disease occurs in children and chronic in adults. Massive destruction of reticuloendothelial and muscle cells occur.

In dog - debility, anaemia, splenomegaly occur.

Cats - convulsion and posterior paralysis.

Diagnosis : In acute case –

1. Thick blood smear to detect trypomastigote or if not detected then-
2. Animal inoculation with blood, spleen or lymph gland biopsy in puppies, kittens, and guineapigs.
3. **Xenodiagnosis** – Feeding of Triatomid bugs on suspected patient or allowed bugs to feed on the patient's blood through a membrane. Laboratory reared and *T. cruzi* free triatomes are used and if the suspected materials is positive, metacyclic trypanosomes are found 7-10 days latter in the dropping of the bugs.
4. Serodiagnosis – CFT, IFA, IHA, ELISA, DAT etc.

Immunity -

Both humoral and CMIR developed. The chronic cardiovascular manifestation occurs due to autoimmune disease condition.

T. cruzi – evade immune response by escaping from the cells.

Subgenus : Megatrypanum

Trypanosoma theileri

Relatively large species, 60-70 μm in length but up to 120 μm may also be occur [where as *T. Evansi* –24 (15-34) μm in length]. Post end long & pointed & kinetoplast lies some distance from the posterior end. Undulating membrane & free flagellum well developed.

Reported in India, world wide in distribution.

Transmission: cyclically in posterior station by tabanid flies such as *Tabanus* & *Haematopota*. Infection by contamination.

In bovine, Trypo & epimastigote forms occur in blood, multiplication take place chiefly in lymph nodes & inner organs.

Non pathogenic & occur in cattle in India, but under condition of stress it may cause serious condition and even death. Cause losses in cattle being immunized with Rinder Pest (RP) or other diseases and may cause Anthrax like disease. It is associated with depressed milk production and abortion in cattle. It is rarely seen in blood. Diagnosis is made by cultivation in media,

PM examination - yellow colouration of tissues, enlargement of sub cutaneous lymph node, congestion of liver etc.

T. melophagium

Non pathogenic species infecting sheep. It is 50-60 μm in length. Transmitted cyclically in posterior station by sheep ked, *Melophagus ovinus*, Infection by contamination of skin and also if a ked is eaten, the metacyclic trypanosomes may penetrate the buccal mucosa. The organism is wide spread.

Trypanosomes of Birds (Avian trypanosomes)

T. avium and *T. gallinarum* – occur in a wide range of birds.

- all non-pathogenic, very polymorphic.

Blood sucking arthropods, mosquito, simuliids & *Hippobosca* act as vector.

Control

1. Chemotherapy
2. Destruction of game animals.
3. Bleeding of trypanosome resistant strains of cattle. N'Dama cattle is a trypano-tolerant breed in west Africa.
4. Elimination of blood sucking flies.
5. *T. equiparum* – quarantine regulations.
6. *T. Cruzi* – elimination of triatomid bugs from dwelling places & destruction of wild animal reservoir.