

Q. Describe etiology, clinical findings, pathogenesis, treatment and control of trypanosomiasis in camel.

Trypanosomiasis, usually caused in camels by the protozoan *Trypanosoma evansi*, is a major clinical disease and cause of economic loss. Unlike other trypanosome species, *T. evansi* does not have to undergo part of its life cycle in tsetse flies and it is transmitted mechanically by other biting flies. These flies are usually of the tabanid group, mainly of the genus *Tabanus*, but some so called stable flies of the genus *Stomoxys*, also transmit the disease. In some of East African countries, the major tabanid vectors are *Philoliche zonata* and *P. magretti*.

Trypanosomiasis is most prevalent in the rainy periods of the year. Herders usually keep animals away from tsetse-infected areas and other known centers of infection but when systems are forced to become sedentary, the risk of infection increases. Riverine areas, large irrigation channels and watering points are always major danger areas, which cannot be avoided completely. All age groups are susceptible and repeat infections are common. Animals under any form of stress, including lactating females, are especially vulnerable to infection. Because of the suppressive effects on the immune system, infected animals also become susceptible to other diseases. Having been present in the blood and lymphatic system, trypanosomes can penetrate the central nervous system and joints and thus may become less accessible to treatment and to clinical diagnosis by demonstration of the protozoan in the peripheral blood stream. The trypanosomes are present in the blood when the camel has fever.

Many older tests for detecting trypanosomiasis, including mercuric chloride, are still used for *T. evansi*. Modern, rapid and effective techniques are increasingly being employed, including complement fixation and card agglutination tests as well as enzyme-immunoassay (ELISA) and radio-

immunoassay (RIA). These are much more effective in detecting the disease than the older ones. Research has shown immuno-assay to be at least six times more sensitive than haematocrit centrifugation and it is recommended that ELISA should be used in the routine diagnosis of infection. New techniques are being developed rapidly and even ELISA may no longer be the most useful diagnostic tool in near future.

Another method for the detection of live trypanosomes in blood is by the use of ion exchange columns. The ion exchange gel is packed into plastic syringe bodies and the trypanosomes are collected in sealed Pasteur pipettes. After centrifugation, the pipette tip while immersed in a very shallow water bath, is examined with a 20 X objective. Trypanosomes may be seen undulating in the fluid within the pipette tip. The method is claimed 98% accurate, but requires more apparatus, preparation and skill development time. More recently a latex agglutination antigen test has been developed and is marketed as 'Suratex'. It comes with all necessary equipment and reagents and can be completed in the field in about 20 minutes. The test has been declared a diagnostic breakthrough by the manufacturer.

The major symptom of the acute form of the disease is severe anaemia. However, in camels the disease due to *T. evansi* is usually chronic. This is typically shown in slow weight loss, intermittent high fever, general muscular weakness, especially in hind quarters, pale mucous membranes and collection of fluid, especially in the abdominal region. Packed cell volumes of blood plasma are usually 18-20% in infected animals compared to an average of 30% (range 24-42%) in healthy ones. In more severe cases, late term abortions and premature births of calves are very common in pregnant animals, resulting also in loss of milk production.

Health care and hygiene programmes can help in control. Watering at night or at midday reduces the risk of being bitten by flies. Preventive measures before the onset of the disease (Chemoprophylaxis) and curative measures after the disease is clinically evident (Chemotherapy) have shown varying success in controlling and combating the disease (Table 32). As for all trypanosome diseases, drug resistance due to misuse and especially by using too small doses or diluting the drug with water or some other liquid is an increasing problem. In addition, some drugs that are effective in other domestic livestock are poorly tolerated by camels. Newer drugs, particularly a new arsenic-based compound and pour-on repellents are helpful in controlling/preventing the disease. Many new drugs are easy to

handle, can be administered by a variety of routes, have wide tolerances, are long acting and may be released into the metabolism over a long period of time for even greater effect.

Until eradication becomes feasible, regular monitoring is necessary to prevent large scale death losses in areas having acute outbreaks and diminished production and athletic performance with the chronic form. The efficiency of monitoring will be greatly assisted by the availability of the ELISA and PCR tests. Simple monitoring on the basis of frequent (1 to 2 weeks apart) estimation has proved useful in areas with high death risk. All camels with a PCV <25% were treated.