

A Brief Insight on Elephants

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Abstract

Day by day, the increase in human-elephant conflict has become a serious matter of concern to the government of India. This problem mostly occurs due to a lack of knowledge about elephant behavior and basic physiology, leading to great losses from both sides in terms of loss of life or serious injury. Furthermore, lack of awareness among mahouts on elephant diseases also leads to the death of elephants as well as the spread of zoonotic diseases to humans and domestic animals. This paper discusses some important information on the behavior, physiology, health signs, and common infectious diseases of elephants

Introduction

Elephants are the largest land mammals on earth. These are very intelligent, complicated, powerful and fun too. For centuries, elephants have been very closely associated with the religion, myths, history, and cultural heritage of India. They are used as a means of transport, tourism, temple processions, circus shows, etc. Despite the long association of elephants with man, they have never been truly domesticated. This species has always remained under the pressure of poaching for ivory, loss of habitat and increasing human-elephant conflict. Reports of human-elephant conflict appear frequently, with great losses on both sides. Humans or their mahouts have frequently neglected these animals, either directly or indirectly, due to a lack of knowledge about their behavior, health signs, and disease patterns. There are two species of elephants, viz., Asian elephants and African elephants. Furthermore, African elephants are also classified into African bush elephants and African forest elephants.

Taxonomy

Family: Elephantidae

Order: Proboscidea

Species: *Elephas maximus* (Asian elephant)

Loxodonta africana (African elephant)

Normal vital parameters of elephant

Parameters	Values
Heart rate	25-30 (standing) 70-90 (recumbency)
Respiration rate	4-12 breaths/min
Rectal temperature	96.6°F

Some physiological features of elephant

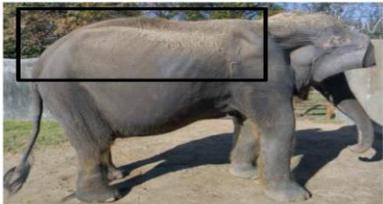
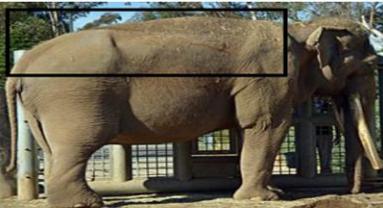
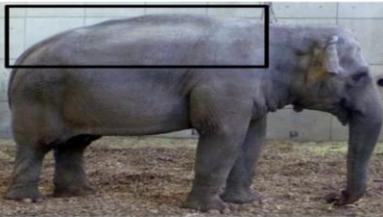
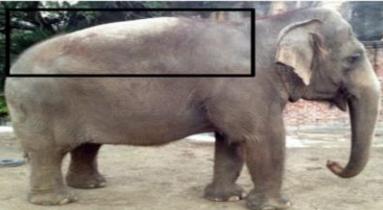
- Average life span of an elephant is 50-70 years.
- Average body weight of a cow elephant is 2.5-3.5 tonnes and bull elephant is 3.5-5 tonnes.
- Normal water intake of an adult elephant is 200-250 L/day i.e. it drinks 3-4 times a day with 50-60 L of water each time. The trunk of an elephant can retain 7-8 L (7.5 L average) of water. The water intake can be approximately calculated by counting the number of trunks of water it has taken multiplied by 7.5.
- The total urine output of an adult elephant is 25-30 litres per day. It urinates 5-10 times a day with an average volume of 3-5 litres during each urination.
- The total faecal output of an adult elephant is 110 kg/day. Frequency of defecation is 10 times with 5-8 boluses/time. Weight of each faecal bolus is 2-2.5 kg.
- Trunk is the fusion of upper lip and the nose which simultaneously act as respiratory, prehensile, sense, drinking and defence organ. The animal also uses its trunk for greeting.
- An important character of elephant is the continuous tearing from the eye due to absence of nasolacrimal duct. Therefore, it should not be considered as a sign of illness in this species.
- Skin thickness of an adult elephant is 2-2.5 cm. Skin is the major thermoregulatory organ in this species as elephant do not have sweat glands. There are few sweat glands just above the nails in young ones.
- Tusk is the extension of upper incisor teeth. It is used as a weapon or as a tool for digging.

How to safely approach an elephant?

An elephant is larger, stronger, and cleverer than a human. It can be dangerous and use its trunk, tusk, front feet, tail or even its mouth to cause injury, even to its mahouts. Therefore, the veterinarian or any person should always give a signal while approaching the animal by making any sound or walking slowly from a side where the elephant can see. The animal should always be approached from the side, not from the front. While approaching an elephant, its behavior should be noted. If the animal moves its ears, swings its tail and turns its rump towards the observer, then it is acting normally and can be approached safely. If the animal folds its ear to its head or stares at the observer, then it is a sign of danger and should not be approached. If the animal tries to attack, never run in a straight line but rather hide somewhere, as the elephant can run a shorter distance at a much faster rate than humans.



How to measure the body condition score (BCS) of an elephant?

BCS	Ribs	Pelvic Bone	Backbone	Example Photographs
1	Individual ribs clearly visible	Protrudes, deep depression in front and behind pelvic bone	Protrudes from tail head to shoulders, deep depression alongside entire backbone	
2	Some ribs may be noticeable, ribs appear to be covered by a very thin fat layer	Clearly visible, obvious depression in front and/or behind pelvic bone	Prominent from tail head to shoulders, obvious depression alongside entire backbone	
3	Not visible	Visible, entire pelvic bone may not be visible, slight depression in front of pelvic bone	Clearly visible from tail head to shoulders, fat beginning to accumulate alongside backbone	
4	Not visible	Slight definition and not entirely visible, slight sunken or flattened area in front of pelvic bone	Visible as a ridge, some regions of the backbone more visible than others due to fat accumulation	
5	Not visible	Not visible	Not visible or difficult to differentiate, area alongside backbone is filled in giving a round appearance	

1. Health signs:

A healthy elephant should exhibit the following behaviour:

- **Flagging of ears** – An elephant should always flag its ears as it is the major mode of thermoregulation in this species. The superficial arteries and veins are anastomosed on the backside of the ear, leading to an exchange of heat between the vessels where heated blood in arteries gets cold by the flagging of the ear.



- ▶ Movement of tail
- ▶ An elephant always bears its weight only on 3 limbs and keeps the fourth one resting, alternatively by shifting its weight from one limb to the other.
- ▶ Inspecting the surroundings with trunk
- ▶ Elephant should always urinate with its penis protruded outside.
- ▶ Thoraco-abdominal respiration
- ▶ **Obedience to command:** A healthy elephant should always obey the command of its mahout. If it is not responding well to its mahout, then the animal may be ill.

Signs of indisposition

Following signs are commonly observed in an unhealthy elephant:

- ▶ Listless or drowsy
- ▶ Muddy discoloration of mucus membrane of palate, tongue and trunk
- ▶ Anorexia and reluctant to drink
- ▶ Loose dung
- ▶ Frequent lying down and getting up
- ▶ Turbid urine

Common infectious diseases of elephants

Like other domestic animals, elephants are also affected by many infectious diseases. Common bacterial diseases include anthrax, haemorrhagic septicaemia, salmonellosis, collibacillosis, mycoplasmosis, tetanus, leptospirosis, enterotoxemia, etc. The most common viral diseases affecting elephants include elephant endotheliotropic herpes virus infection (EEHV), foot and mouth disease (FMD), rabies, encephalomyocarditis, elephant pox, West Nile viral disease etc., and common parasitic diseases include trypanosomosis (mostly in Thailand), filariasis, fasciolosis, schistosomiasis etc. Some important infectious diseases are discussed here.

Elephant tuberculosis

Mycobacterium tuberculosis in elephants is caused by *Mycobacterium tuberculosis* and sometimes *M. bovis* (Rajbhandari *et al.*, 2022). Some non-tuberculous mycobacteria like *M. avium* are also commonly isolated from trunk wash, but these are not associated with clinical disease. Usually, human activity leads to the shedding of organisms into the wild animal environment. This disease may also be transmitted during greeting or trunk spraying due to aerosolization of infected droplets. During necropsy, infected aerosol particles may also disperse into the environment. The bacteria enter into the elephant body mainly through inhalation routes and reach the alveoli of the lungs where they enter into the alveolar macrophages. Then the bacteria multiply inside the macrophage. Eventually, it causes caseous necrosis of the lungs, leading to the death of the animal. No typical signs are exhibited by the affected elephant. However, there may be anorexia, chronic weight loss, weakness, exercise intolerance, and abnormal discharge from the trunk. Definitive diagnosis can be made by isolation and



identification of bacteria from trunk washes, bronchoalveolar lavage and blood sample. The organism is demonstrated by acid fast staining. The intradermal tuberculin test is generally not used in this species for the diagnosis of TB because of its low sensitivity. Other highly sensitive tests like ELISA and PCR can be done in suspected cases.

Treatment

The commonly used drugs for elephant tuberculosis are:

- (i) Rifampin @ 7.5-10 mg/kg, orally
- (ii) Isoniazide @ 2.5-5 mg/kg, orally/rectally
- (iii) Pyrazinamide @ 25-35 mg/kg, orally/rectally
- (iv) Ethambutol @ 30 mg/kg, orally

Standard protocol: administer any three drugs from the above list for first 2 months followed by two drugs for next 10 months.

Anthrax

Anthrax is a per-acute to acute febrile infectious bacterial disease caused by *Bacillus anthracis*, an endospore forming aerobic, non-motile, gram-positive rod-shaped bacteria. This disease is commonly seen in free-ranging elephants and causes significant mortality. Transmission of this disease occurs in various ways. Scavengers may open up a carcass of infected animals, and spore formation occurs when the organisms are exposed to air (Bakhteeva and Timofeev, 2022). Scavengers' feet and hair coats carry vegetative spores, which are picked up by winds and aerosolized. Vultures may contaminate the water bodies after engorging on a carcass with their contaminated feet. Flies may transmit the disease by biting or contaminating wounds. Infection usually occurs after ingestion or inhalation of anthrax spores. After entry into the body, the bacteria localises in the lungs and intestine where it is phagocytized by the macrophages. Then the bacteria replicate inside the macrophage. The macrophage bursts, and infection spreads throughout the body. The infected animals are mostly found dead. There is sudden death with no pre-monitory signs. Tarry-colored blood discharged from the body orifices like a trunk (Fig. 1). Sometimes, dyspnea, ataxia, listlessness, swollen trunks, trunk paralysis, etc. may be seen. The

infected animals do not obey the commands of their mahout.



not obey the commands of their mahout.



Fig 1: Oozing out of tarry colored blood from trunk
Haemorrhagic septicaemia

Pasteurella multocida, gram-negative, rod-shaped, facultative anaerobic bacteria with bipolar staining, causes haemorrhagic septicaemia, a per-acute disease primarily affecting the respiratory organs. This disease commonly occurs in outbreak form and is mostly transmitted through aerosol routes or ingestion of contaminated feed and drinking water. Common clinical signs in elephants affected by haemorrhagic septicaemia include anorexia, high rectal temperature, dyspnoea, diarrhoea, yawning, and sudden death. Definitive diagnosis can be done by the isolation of bacteria from trunk wash or bronchoalveolar lavage fluid. The affected animals are treated with Suphadimidine @ 200-250 g orally on the first day and 100-125 g daily for the next 3-4 days.

Elephant Endotheliotropic Herpes Virus (EEHV) Infection

EEHV infection is an acute fatal haemorrhagic disease caused by elephant endotheliotropic herpes virus under the family *Herpesviridae*. Secretions of trunk, saliva and other body fluid from infected animals are the major source of infection. The disease is transmitted by direct contact with the secretions from the infected animals. As it is an endotheliotropic virus, it targets the capillary endothelial cells of the heart, liver and tongue and damages the capillaries which lead to leakage of blood and plasma into the extravascular space. Most of the affected animals die due to circulatory shock rather than blood loss. The common clinical signs include edema of the head, neck and subcutaneous tissue, cyanosis of tip of the tongue, lethargy, anorexia, ulceration of oral cavity etc. Thrombocytopenia, anemia and hypoproteinemia are the common pathological abnormalities found in this disease (Guntawang *et al.*, 2021). During necropsies, there will be widespread haemorrhage (Fig. 2) and petechiation of multiple organs, hemopericardium, cerebral haemorrhage and oedema etc.



Fig 2: Haemorrhages in mesentery found during necropsy

The affected animals can be treated with antiviral drugs

- (i) Famciclovir @ 12 mg/kg, q6hrs on first day followed by 12 mg/kg, bid for next 3 weeks, orally or rectally.



- (ii) Ganciclovir @ 5 mg/kg, bid, orally or intravenously.
- (iii)

Along with antiviral therapy, the affected animal should be administered with supportive therapy including antibiotics, intravenous colloidal fluid (hetastarch, dextran) or hypertonic saline (7.2% NaCl) @ 50 ml/kg/hr, diuretics (mannitol, furosemide).

References

- Guntawang, T., Sittisak, T., Kochagul, V., Srivorakul, S., Photichai, K., Boonsri, K., ... & Pringproa, K. (2021). Pathogenesis of hemorrhagic disease caused by elephant endotheliotropic herpesvirus (EEHV) in Asian elephants (*Elephas maximus*). *Scientific reports*, *11*(1), 1-13.
- Rajbhandari, R. M., de la Fuente, J., Karmacharya, D., Mathema, S., Maharjan, B., Dixit, S. M., ... & Alves, P. C. (2022). Understanding Mycobacterium tuberculosis complex in elephants through a One Health approach: a systematic review. *BMC Veterinary Research*, *18*(1), 1-15.
- Bakhteeva, I., & Timofeev, V. (2022). Some Peculiarities of Anthrax Epidemiology in Herbivorous and Carnivorous Animals. *Life*, *12*(6), 870.

