Chapter 1

Introductory Chapter: Health Management of Big Cats

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1. Introduction

Nature has imparted resources for survival and sustenance of life on the Earth. About 8.7 million (6.5 million on land and 2.2 million under ocean) known species of flora and fauna are dispersed in the different geographic zones, and some of them are indicator species. The big cats have been playing a vital role in establishing population equilibrium among primary, secondary and tertiary consumers in the sylvatic food chains [1]. The big cats had been placed taxonomically under Felidae with four subfamilies, viz. Pantherinae, Felinae, Machairodontinae (extinct) and Proailurinae (extinct). However, in the present status, there are only three regions around the world where population of felines exists, viz. Africa (cheetah, leopard and lions), Asia (Asiatic cheetah, Amur tiger, clouded leopard, Sunda clouded leopard, snow leopards, Asiatic lions and tigers) and North and South America (cougars and jaguars; Spanish lion and tigers). According to the geographical background of *Panthera* species, tiger, lion and cheetah are evolved from their prehistoric creature called cave lion. Despite of infighting and retaliate killing, the disease manifestations in big cats were underestimated albeit emerged as serious threats for their survival.

In the present scenario, the complexities of challenges are gradually expanding through encroachment of forest land and increasing interaction between humans and domestic and wild animals leading menace to wildlife. Nonetheless, the admixture process of companion animals in the free-ranging habitat for sharing grasslands or water holes is a key factor for disease transmission in either of wild or domestic animals [2]. Indiscriminate uses of forest wealth and simplification of the ecosystem are determined causes for unwarranted migration of zoonotic pathogens from sylvatic to domestic cycle and vice versa [3]. Many pathogens of bacterial, viral as well as parasitic origins have been changing their migration pattern owing to consistent human interventions in the forest habitat. Therefore, susceptibility of zoonotic diseases is also increasing and expanding their host ranges day by day. The tribal population of adjoining areas of national parks and sanctuaries is more prone to such zoonotic infections as they utilise the common water resources.

It has been believed that free-ranging wild animals are comparatively possessing a high standards of health which is rigidly maintained by the action of natural selection. But owing to increased human interference, poaching and destruction of habitat, most of the significant threats are health related [4]. Therefore, the use of advance technology for health monitoring, disease diagnosis and forensic investigations and their legal use are need of the hours for conservation strategies of wild animals.

2. Status of health management practices

Till the recent past, emphasis on ecological management has been focused on strengthening and provoking natural devices for conservation of wildlife wealth, whereas health management aspects were out of focus. Only firefight approaches were made out, and it was sometimes exclusively restricted to rescue of ailing wild animal. Up to 1990, there were limited amenities for restraining of wild animals, whereas after introduction of chemical immobilisation and modern technologies, the task became far from fear and turned into a mandatory component for drug orientation and health monitoring of felines [5]. Large-scale mortality in the African lions in Serengeti Reserves in South Africa due to canine distemper and also due to *Feline panleukopenia virus* in 1995–1996 in different parts of the world including Japan and India was the eye opener in an Indian subcontinent. Subsequently, the government and national and international NGOs forced to think and adapt scientific wildlife health management strategies in their conservation programmes.

The present book has been focused on big cats and probably would be a tool for conservationist, wildlife biologists and wildlife veterinarians for making a concrete research programme to study anatomical variations, habit, habitat and their health aspects, including treatment, disease diagnosis and also active veterinary interventions, for their sustenance and survival in the free ranging as well as captive conditions.

The following are the key points for the successful health management programme either of captivity or in free-ranging habitat:

I. **Care and management in zoos/captivity:** The main objectives of zoos and captivity are conservation education, breeding of critically endangered species, recreational values and also scientific studies on various aspects related to behaviour and health of the animal species. However, the risk factor during health monitoring and treatment is always around the veterinarians, but following the standard operating procedures and the use of diagnostic tools, the handling of situations both in free ranging and captivity may ease the task. The handling of wild animals in captivity is quite complex and challenging, which needs knowledge about habit and health status of particular species. Sometimes, they have camouflage attitude showing false sickness, aggressive behaviour or even unpredictable posture during collection of biological samples for disease diagnosis [6]. Therefore, during health monitoring or shifting of animal from the zoo, the imitation of standard guidelines shall be followed (**Figure 1**).

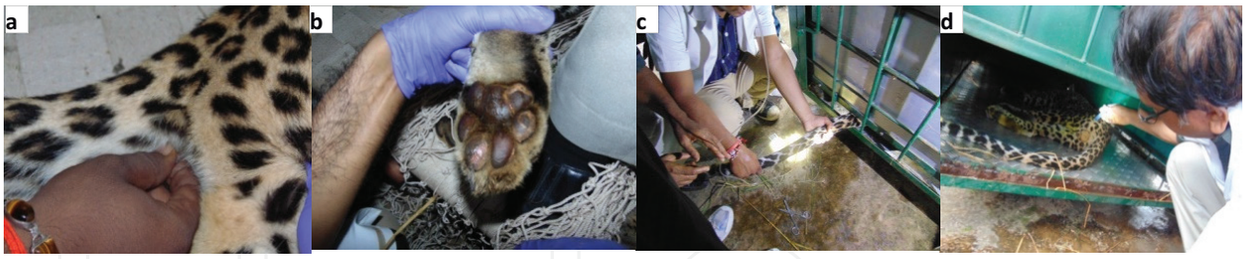

Figure 1. Health monitoring of ailing captive leopard: (a and b) monitoring of skin coat and cushion pad injury; (c) using caudal vein for blood collection and drip administration (d) drug administration by intramuscular root.

II. **Analysis of health aspects in free-ranging habitat:** The assessment of disease manifestations has yet not been fully warranted, but veterinary scientists have developed a predictive model through clinical symptoms, changes in behaviour as well as their physical appearances. The ailing wild animal subject to assess the risk of diseases and needs to be attentive for their care well in time. In free-ranging animals, veterinary interventions are difficult and need multidisciplinary approach for restraining, radio collaring, treatment or collection of biological samples for laboratory investigations to evaluate health status (**Figures 2** and **3**).

III. **Precautions during immobilisation:** The most adventurous and mandatory tasks of veterinarians are confined to restraining, radio collaring, health monitoring, disease diagnosis and reintroduction of wild animals. In such conditions, calculation of doses and combination of drugs for each and every circumstance seem rather difficult, and only a trained and experienced wildlife veterinarian knows better for how and why requisite doses may be administered to down the animal. The expert opinion/guidance may be helpful in commencing the plan; permission from the competent authorities is essential. The operational team must be well equipped along with sufficient number of wildlife veterinarians for successful operation and also to minimize the chance of errors [4]:

   i. Every step, in handling and in also administration of drugs in big cats, must be introduced slowly and carefully to avoid flight fear reaction and stress.

   ii. The use of appropriate bait prior to immobilisation/restraining of targeted animal.

Figure 2. Health monitoring and radio collaring of tiger: (a) immobilised tiger; (b) collection of blood, urine and faecal samples; (c and d) radio collaring for ecological studies and revived tiger.

iii. For captive animals, the physical presence of the caretaker is a must during handling or restraining.

iv. Blindfolds must be used; excessive noise and touching stress should be minimised.

v. Excessive and rough handling or stress in the restrained animal can lead to hyperthermia and capture myopathy particularly during warm or hot climate; therefore, such incidents may be avoided.

vi. Capturing and restraining of pregnant animals may be avoided.

vii. Physical posture of the sedated big cat must be in normal sitting posture to ensure that animal's smooth breathing should not be compromised.

viii. It is important that handler should protect themselves against possible injuries, exposure to drugs or chemicals, animal excretions, etc. to avoid zoonotic infections.

IV. **Study of emerging disease threats:** The infectious diseases like *Feline panleukopenia virus*, canine distemper, feline viral rhinotracheitis, feline calcivirus infection, feline infectious peritonitis, feline immunodeficiency virus, ehrlichiosis, trypanosomiasis, babesiosis, paragonimiasis and gnathostomiasis are fatal; therefore, their prevention and control are important both in captivity and free-ranging populations. On the other hand, the laboratory diagnostics are important; thus, appropriate samples in proper preservative are important for diagnosis.

V. **Post-mortem examination:** The proverb has been very common among pathologists as 'the carcass never tell lies providing expert knows the language of carcass'. Really, it means as the correlated post-mortem changes may lead to the past history and situation by interpreting the lesions present on the external surfawce and internal organs (**Figure 4**). On the basis of the presence of lesions, tentative diagnosis may be ascertained and communicated to competent authority for appropriate action.

VI. **Study of human and wild animal interface:** Human and domestic animal intermixing with wild animals may communicate to zoonotic disease particularly tuberculosis that poses a threat to the health of wild animals. It is also responsible for human wildlife conflict resulting into poaching, poisoning and electrocution of problematic or distressed wild animals. So there is a need for disease surveillance plan along with scientific views to overcome human wildlife conflicts.

Figure 3. Surgical interventions for severely injured free-ranging tiger (a and b) and for extraction of neoplastic growth in oral cavity of a captive tiger (c and d).

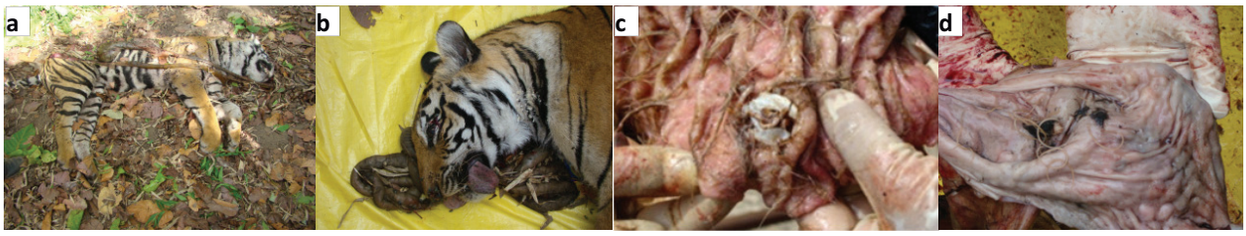

Figure 4. Post-mortem examination of carcass of a tiger. (a) Emaciated carcass. (b) Cynotic tongue. (c) Nodular worm (*Gnathostoma spinigerum*) in the stomach. (d) Presence of *Toxascaris leonina* worms and haemorrhagic enteritis in small intestine.

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