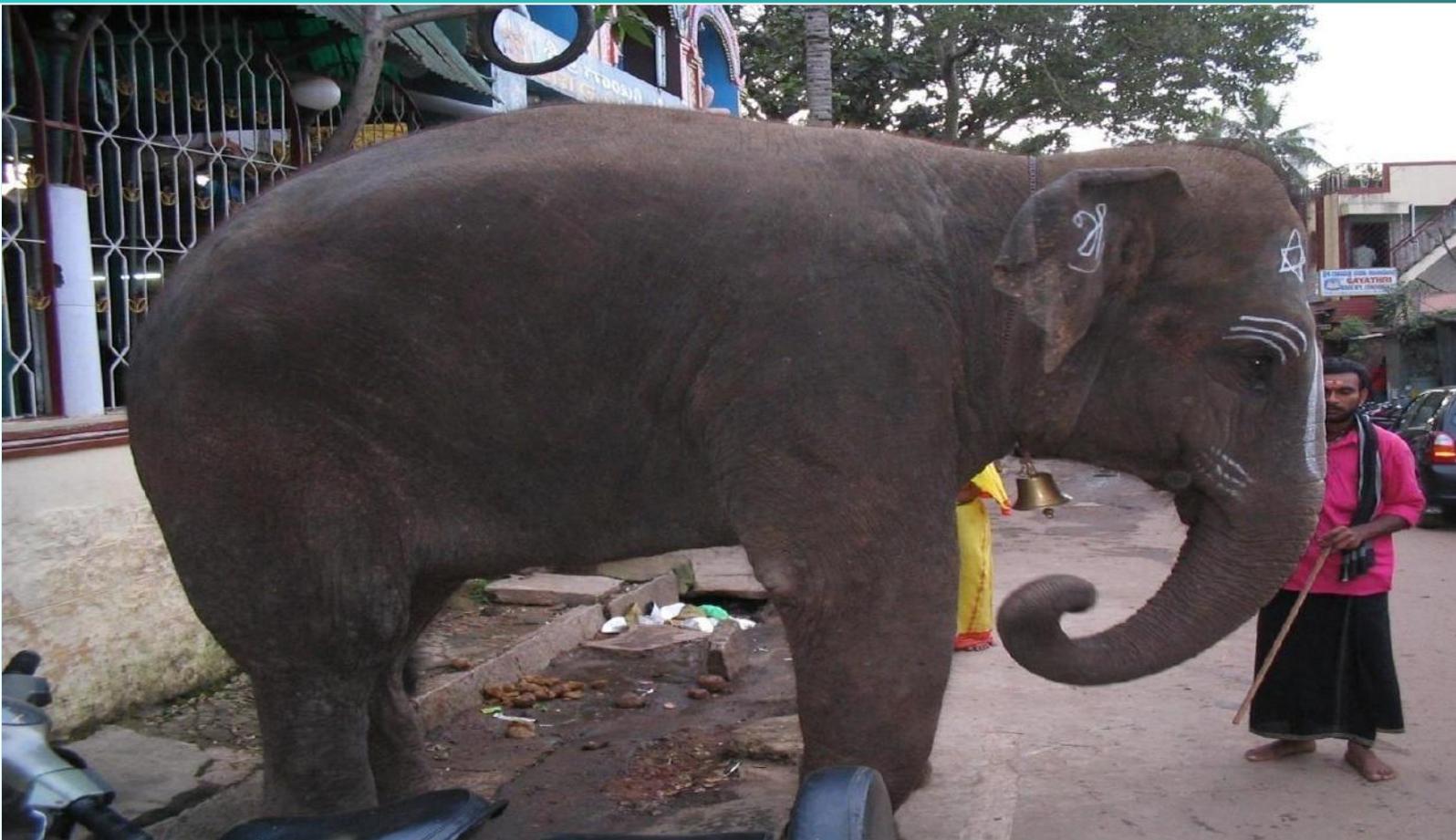


Management Strategies for Captive Elephants Infected with Tuberculosis in Asian Range Countries



**David Abraham, Surendra Varma and
Suparna Ganguly**

Elephants in Captivity: CUPA/ANCF- Occasional Report No. 6



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Preface

Elephants are known to be susceptible to the human strain of Tuberculosis (MTB). A study of the health status of elephants kept in different management regimes has opened up an area of interest in developing a management strategy for dealing with MTB affected elephants and the study also revealed that among institutions, this disease is most prevalent among elephants in temples, “maths”, privately owned elephants.

The prevalence of MTB in these elephants suggests that exposure to unnatural environment, inadequate and insufficient resources appear to be primarily responsible for the infection. It is found that animals are usually affected by Tuberculosis while they are in an urban, unnatural environment. Once affected, they may be shifted to the State-run Forest Camps which in turn moves these elephants across various forest camps for a variety of reasons. An important challenge in managing such elephants is the threat of the disease spreading to other elephants and possibly to other wildlife existing in these forests.

It is known that Indian wildlife is already under many threats and a disease-based threat such as this may be an added problem. From a welfare point of view, the diseased elephants housed in forest areas not only suffer, but may cause much more damage to the indigenous wildlife. A section of the society, people who work for animal welfare may feel that these infected animals should be freed and sent to live in the forest. However, they may not realise the impact of an unhealthy population on local wildlife. The spread of infection is not restricted only to wildlife; it may also be an added risk to human health.

This investigation hopes to understand the status of MTB in confiscated elephants, and the support management institutions expect to combat this. Although the results of the current investigation on MTB infected captive elephants are based on a single case study of the problem, the case study provided opportunities to understand many aspects associated with the infection. The investigation also makes attempts to discuss management decisions and associated constraints, and resource (man-power, space, fund, expertise) limitations. It is hoped that the insights gained through the investigation might trigger the interest of concerned authorities and like-minded people to develop and adopt specific strategies for the management of captive elephants suspected to be infected with MTB.

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Abstract

A review on the management strategies needed for captive Asian elephants infected with MTB, maintained in temples, zoos, by private individuals and State forest camps in India, was undertaken. Specific knowledge on the subject was gained from monitoring a female elephant that belonged to the State Forest Department after being confiscated from a temple. The animal was managed by the forest department for more than a year, after it was diagnosed with seropositivity for MTB. The inferences drawn from the study point at the need for creating awareness of the constraints and limitations in the management of captive elephants affected with tuberculosis. This analysis intends to examine the best possible action from the authorities, concerned managers, veterinarians, elephant owners and the public in general.

Introduction

According to the World Health Organisation figures, India reports the largest number of human tuberculosis (MTB) cases in the world. India also has the largest number of wild Asian elephants in the world and the second largest number of captive elephants, after Myanmar (Sukumar 2003, Baker & Kashio 2001). Elephants are known to be more susceptible to the human strain of TB (*Mycobacterium tuberculosis*) (Mikota, et al., 2001) and also to the bovine strain (*M. bovis*). There are reports of TB in elephants in *Hastayurveda*, the ancient Indian text on elephants, the first published report of a case of TB in a captive elephant in southern India seems to be in 1925 (Narayanan 1925).

The first systematic study to assess the seroprevalence of TB in captive elephants in India was undertaken only recently (Abraham *et al.*, 2008). The investigation showed that, including those captive elephants kept in camps belonging to various State forest departments, every management regime had elephants that showed seropositivity to MTB infection. A relatively higher sero-prevalence was observed among elephants maintained in temples as compared to those maintained by the State Forest Departments and private individuals (Abraham *et al.*, 2008). The study revealed that the elephants kept in near-natural conditions such as camps belonging to the State forest departments, having greater opportunity for expressing a variety of natural behaviours in addition to intake of nutritionally balanced food were found to interact with the public to a lesser extent and lead a relatively stress free life compared to the temple and private elephants. These appear to be the reasons for lesser sero-prevalence of MTB among such elephants.

Translocation of elephants from management regimes with higher prevalence of MTB can become a source of infection for elephants in disease-free locations. Consequently, it is a better idea to prevent the movement of captive elephants to different locations in the absence of proper testing of infectious disease. This is compounded by the fact that availability of a reliable diagnostic test, to screen MTB in elephants, is a main limitation. There are serious conservation, public health and welfare implications attached to the management decisions that need to be taken for captive elephants infected with TB. Insufficient level of knowledge and awareness regarding the issue seems to be the major reason for underestimating the management problems.

Infected captive elephants can be a source of infection to the keepers as well as to the general public, who interact closely and more frequently, with the infected animal. Without having a clear understanding and lack of proper management strategies, the welfare of the diseased elephant can be seriously compromised, especially when it is due to apathy and negligence from the owner. Of these, the threat to conservation appears to pose the greatest risk since the spill-over of the disease to wildlife is often irreversible.

Case Study: A confiscated temple elephant taken to a zoo based forest camp

A female Asian elephant*, aged about 20 years, belonging to a temple, was maintained in poor welfare standards in terms of housing and feeding provided by the owners. Records showed that this elephant was born in a forest based elephant camp in southern India, and subsequently was bought by the temple authorities when she was three years old. The welfare status of this elephant at the temple was studied as part of a nation-wide survey and the finding on the welfare status has been presented to the forest department (Varma *et al.*, 2006). The result highlighted the exposure of the elephant to congested urban areas with high human population density, absence of natural environmental conditions and of having been brought up in isolation without recourse to expression of species-specific behaviour. Based on the report and public demands, the State forest department confiscated the elephant from the temple authorities and it was taken to a biological park abutting a forest.

Health screening of the confiscated female elephant was undertaken when deterioration in the elephant's body condition was observed. A request was made by a welfare organisation to screen the elephant for TB. Approximately 15 ml of blood was collected from the ear vein and using the serum, the rapid serum test (Elephant TB STAT-PAK®) was performed following the prescribed testing methods. The results indicated that the antibody responded to both *Mycobacterium tuberculosis* and *M. bovis* in the preliminary rapid test conducted. Induced stress through performance of human-controlled work behaviours without access to proper shade or shelter and provision of nutritionally imbalanced food as well as dependence on scavenged sources of food such as public garbage bins had possibly predisposed her to the present ailment.

It is important to note that at the park the elephant was kept for one year with nine other captive elephants and a range of other captive wildlife (Figures 1a, b, c, d, e, and f). The landscape of the biological park continues into a

* Names of the elephants and institutions associated are withheld for obvious reasons of anonymity

scrub forest which is a designated protected area. All the captive elephants in this park are allowed to free range at night in the adjacent forest frequented by wild elephants. Visitors to the park interact with some of the elephants through tourist rides and there are nearly 10 mahouts and a veterinary doctor attending to these elephants. Previously, a male elephant confiscated from another temple in Bangalore (Varma, 2007), was also part of the group. Presently this particular male (Figures 2a and b) elephant has been shifted to another elephant camp belonging to the same State forest department. The shifting of the male, if infected by the female while he was in the park, could be source of contamination for other camp elephants and wildlife around the new camp.



a



b



c



d



e



f

Figures 1a, b, c, d, e and f: Confiscated temple elephant; past and current status; a and b: kept alone and involved in unnatural activities; c, d, e and f; interaction with other camp elephants; note the closeness of a new born and growing calf



a



b

Figures 2a and b: Another confiscated temple elephant; note its interaction with mahout (the elephant also exposed to 16 other elephants in the camp)

While this issue was under critical review, another female elephant belonging to another temple (Figures 3a and b) in southern India that had also tested positive for TB was confiscated from the temple and kept in the forest camp. Her shift to the forest camp apparently resulted in infecting other captive elephants in the camp.



a



b

Figures 3a and b: Another confiscated temple elephant; note its interaction with mahouts (the elephant was also exposed to another 21 elephants in the camp)

Subsequently, from the camp she was shifted to a zoo where she died and was confirmed for MTB. From these two known examples of MTB infected elephants of temples and their translocation to forest camps and the zoos, it appears that such a strategy could be a possible potential source of infection to other captive elephants. From these two examples, specific insights into the subject and issues could be drawn. This investigation is an attempt to critically review the consequences of a disease, its dynamics of spread and management strategies related to the problem.

TB Positive Elephants and Consequences

The options available when an elephant has tested positive for TB usually weighs against the availability of resources and standards to be maintained for therapeutic purposes and control of the spread of the disease.

- The United States has an established protocol for treatment and care of TB positive elephants (Anon, 2003). This is backed by the expertise available along with maintenance of quality standards in pursuance of this protocol. Their protocol includes classifying the elephants based on test results and exposure to other TB positive animals. Based on this classification the elephants are subjected to segregation and multi-drug treatment against TB. All the elephants whether positive or not, are subjected to periodic testing for TB. Necessary precautions are undertaken for human handlers. The British and

Irish Association of Zoos and Aquariums (BIAZA) mandate periodic tests for TB among its elephants as a measure to control the disease.

- Other methods followed are: Test–Euthanize and Test–Segregate–Treat (Merck Veterinary manual) of the affected animal.
- As mentioned earlier, elephants kept in forest camps are exposed to comparatively undisturbed life and nutritionally balanced food. This may be one of the reasons for the lesser prevalence of TB among such elephants. However, such elephants and the wildlife in the vicinity, including free-ranging wild elephant, may become susceptible to exposure to a TB source such as an introduced captive TB positive elephant during critical periods such as summer months.
- The occurrence of TB has human health implications (Michalak et al., 1998). Consequently, it may not be a good practice to shift elephants without testing for disease. The non-availability of a reliable diagnostic kit for TB has been the main limitation to this and NOT the lack of readiness/willingness from any concerned party.
- Before the advent of medicines as a cure for TB in humans, the practice followed was provision of a sanatorium for TB positive people (Mikota, in press). Such places provided a stress-free environment with plenty of rest and airy, sunlit areas. Provision of a stress-free environment for overworked, underfed and alienated captive elephants which have tested positive for TB could be the best option for containment of the disease. These quarantine areas remain isolated from possible contact with the general public as well as the surrounding wildlife. Prevention of contamination of the environment from sources such as elephant excreta, left-over food are also to be considered. These designated care centres should also try to ensure a stress-free environment with provisions for expression of species-specific behaviour and natural conditions for the elephant. Handlers are to be equipped with necessary accessories and precautionary measures to avoid being infected with the disease.

Based on these experiences and expectations, the following inferences were drawn and precautions suggested for the management of TB infected captive elephants that are exposed to wild elephants, other wildlife and human beings

- A positive result on using this rapid serum test may be considered more reliable than compared to other techniques for diagnosis of TB in elephants. However, there are positive and negative reviews about the rapid serum test and the influence of false positive results remains to be a critical issue. Secondly, the test does not give the complete picture of the stage or extent of disease, i.e., whether the elephant is shedding the pathogen as discharge from its trunk or not. Hence, to ascertain the stage of infection, a positive rapid serum test result needs to be followed with culturing of the trunk wash to ascertain the shedding status.
- All elephants and handlers exposed to the infected elephant are to be tested routinely for TB as early as possible. The handlers working with the positive elephants are to be provided with special masks certified for protection against TB. Handlers are to be x-rayed and not just subjected to the skin test since most of them would have had BCG vaccine and may give false positive result based on skin test.
- All the other elephants in the group should be tested with the rapid serum test, the positive ones segregated and kept away from the negative elephants. Segregation guidelines must be specific but at the same time can be reasonable so that the elephants can be managed in their current locations and not moved around. Positive elephants are micro-chipped to document the disease status with proper identification and also can be located if translocated.
- Identification of a quarantine location. The location of this quarantine facility is ideally expected to be away from the forests where there are wild elephants. Like the TB sanatoriums for humans, it is located in open places with plenty of sunlight and air. TB positive elephant(s) should be managed by keeping them at a reasonable distance away (75-100 feet/out of range of physical contact with other elephants and out of spraying distance). Such elephants have to be given separate bathing and grazing areas so that they do not intermingle with elephants that tested negative.
- Ideally the infected elephants fall under long term management in a lifetime care facility with provision for nutritionally balanced diet, incentives and protection to the keepers.
- Euthanasia of the infected elephant could be an optional and an effective way of preventing spread of the disease to other elephants/wildlife/humans. It is also cost-effective. In a scenario where other camp elephants also test positive for TB, the same procedures are followed for the remaining infected elephants.

This will enable the future courses of clinical management and containment as these animals could be a source of spill over to other elephants or wildlife which may come in contact with the affected ones.

Evaluation of Constraints

The management options for active cases (which are culture-positive) are (1) treatment, (2) segregation or (3) euthanasia and for latent cases (culture-negative, serologically positive) must be monitored for active disease (Mikota *et al.*, 2006). All available management options are critically analysed with the objective of identifying the best possible solution to each of the constraints that prevailed. The following are the primary constraints that were observed:

1. At present, there are no specific guidelines approved by any authority in India to deal with the current situation of TB among captive elephants and its management. Also, there is no scientifically approved precedence for this problem since the diagnosis of this disease is even now a challenge for field veterinarians.
2. Quarantine facilities for elephants are not available with the State Forest Departments to keep the infected elephants isolated from other captive elephants and also wild elephants.
3. There is some confusion about methods for segregation and quarantine among managers.
4. If TB positive and negative elephants have to be separated, they would suffer. In a related and a close-knit herd separating would be harder than usual. It may add to the stress of the animals.
5. Management of positive elephants by segregation/quarantine would mean that affected elephant will have to be stall-fed. Stall feeding enhances the upkeep and maintenance cost by about four times. The economy of the forest camp based elephant camps is dependent on forest foraging which is good for all concerned. Stall feeding is not an option considered readily by managers.
6. The situation in the zoo may be a setback for the public visiting the zoo. Media covering the issue is less likely to understand the situation properly and an unwanted blame game will not help to address the problem constructively.
7. Financial implications of setting up isolation and lifetime care centres for elephants are huge and without government assistance appear to be unrealistic and impossible for any NGO to initiate such an approach for the care and management of the infected elephants.
8. Authorities concerned with human TB eradication in India may not agree with treatment as an option, especially, since India is viewed as being endemic for human TB occurrence.
9. Treatment of TB is extremely difficult in elephants, especially in older elephants. Elephants above 60 years of age should not be treated at all since the disease would have spread and it is difficult to attain the required dosage levels of the drugs.
10. Considering the religious, cultural background of elephants in India as well as the endangered status of this species, euthanasia is not an easy proposition in elephants as is done to other domestic livestock.
11. It remains quite uncertain as to how the Government will react and whether they would be serious about this issue at all. Since TB in captive elephants is a social issue, it requires tremendous administrative and political will of all concerned authorities to address the problem effectively.

Addressing the Constraints

The constraints listed above can be resolved properly only with support from the government authorities, supplemented by NGOs. Following the protocol of the United States' National TB Working Group for Zoo and Wildlife Species, a similar planning framework for TB Control in Captive Elephants in India needs to be developed. This can address the country-specific constraints observed. The Government should immediately draft a copy of a similar protocol for control of TB in captive elephants with scientific and technical support from various agencies.

Creating a facility like the TB sanatoriums for human TB patients that consists of a stress-free environment for the infected elephants (these elephants are usually overworked, underfed and alienated from natural surroundings) will help provide proper lifetime care facility. This also helps to contain the spread of the disease. Locations of such facilities should preferably be away from forest areas to avoid the spread of disease to wild elephants.

It is important that proper quarantine and segregation guidelines have to be formulated for infected elephants. Such guidelines should not exclude the option of treatment as well as provision for expression of species-specific behaviour and natural conditions. Competent authorities and professionals engaged should understand the need to take charge of the lifetime care facilities required and ensure proper standards of management and treatment. There should also be regular inspection and monitoring of the protocols by an independent authority to ensure consistent maintenance of standards. Care should be taken to ensure prevention and curtail further spread of infection from sources such as elephant excreta/ food source/ movement of people to and from such areas. The

government should provide the basic infrastructural support required to start lifetime care facilities for the infected elephants.

Euthanasia is the most preferred management strategy in many western countries to control TB among animals in captivity. However, euthanasia of elephants may not be possible in the Indian context for several obvious reasons such as animal rights groups or religious sentiments and cost –economics of professional management. The elephants kept in such a lifetime-care/quarantine facility should be assured of a stress free environment without any work and this should be coupled with properly monitored periodical testing of their health status. Handlers need to be provided with necessary accessories and provided with proper training to take precautionary measures to avoid being infected.

Conclusion

This particular investigation of a confiscated temple elephant with a potentially enhanced risk of being a source and spread of MTB infection to other forest camp and free living wild elephants is an important issue from welfare point of view. Further, the risks associated with transportation and translocation of such captive elephants to different locations without following proper screening protocols for health and quarantine will complicate the issue further. Returning the confiscated elephant to the temple is not the desired option from the welfare perspective. However, from the conservation perspective, keeping such diseased elephants with the other healthy camp elephants which may have in turn easy access to free-ranging wildlife, is also not an ideal option. One has to exercise real caution in addressing such welfare issues, particularly for captive elephants maintained in temples which have been tested and show high sero-prevalence for MTB.

It is essential for the State forest departments to follow specific health screening protocols before transporting confiscated temple elephants and keeping them with other elephants in the forest camps. The respective state governments with assistance from various NGOs and other concerned institutions/organisations should develop appropriate protocols for screening health status and quarantine measures. The concerned governmental agencies should also initiate steps to start lifetime-care facilities for such diseased captive elephants. However, even this has limitations, if one considers the risk of spread of disease to other healthy elephants by their close contact.

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Compassion Unlimited Plus Action (CUPA) is a non-profit public charitable trust registered in 1991 that works for the welfare of all animals. Since 1994, CUPA has worked in close collaboration with government departments and agencies on various projects. CUPA's mission is to protect animals from abuse and violence and do what may be required to alleviate their suffering at the hands of humans. CUPA does not differentiate among pet, stray or wild animals, since all of them require assistance and relief from cruelty, neglect and harm. The organisation's objective has been to design services and facilities which are employed fully in the realisation of these goals.

Wildlife Rescue & Rehabilitation Centre (WRRC) is a registered public charitable trust for the welfare of wild animals and birds that often find themselves trapped in an urban environment. The Trust is a sister concern of CUPA and both organisations complement each other in their services. WRRC was established as a separate Trust in 1999.

Asian Nature Conservation Foundation (ANCF) is a non-profit public charitable trust set up to meet the need for an informed decision-making framework to stem the rapidly declining natural landscape and biological diversity of India and other countries of tropical Asia. The Foundation undertakes activities independently and in coordination with governmental agencies, research institutions, conservation NGOs and individuals from India and abroad, in all matters relating to conservation of natural resources and biodiversity, endangered flora and fauna, wildlife habitats and environment including forests and wetlands. It participates and disseminates the procured information, knowledge and inferences in professional, academic and public fora.

World Society for Protection of Animals (WSPA) With consultative status at the United Nations and the Council of Europe, WSPA is the world's largest alliance of animal welfare societies, forming a network with 910 member organisations in 153 countries. WSPA brings together people and organisations throughout the world to challenge global animal welfare issues. It has 13 offices and thousands of supporters worldwide.

Photo credits: Front cover Rajendra Hasbhavi, Figures 1a,b,c,d, e and f: Savitha Nagabhushan; Figures 2a,b and back cover Surendra Varma,



The investigation shows that including those elephants kept in forest camps, every management regime that keeps elephants is infected with Tuberculosis (TB) and a relatively higher prevalence of the same is among elephants maintained in temples compared to captive elephants maintained by State forest departments and private individuals. There are also serious conservation, public health and welfare implications attached to TB in captive elephants, however, reduced level of knowledge and awareness seem to be the major cause for underestimating the implications of TB.

