

EXPERIENCE OF RESTRAINING ELEPHANTS IN MUSTH

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ABSTRACT

Musth has implications for maintenance in captive populations as management of these animals is quite cumbersome and involves considerable risk. The present study highlights successful restraint of elephants in *musth* on three different occasions employing sedative/analgesics. Effective levels of standing sedation could be achieved using xylazine hydrochloride and ketamine hydrochloride at a dose rate of 0.13 mg/kg and 0.04 mg/kg body weight respectively for immediate restraint. The subsequent actions following sedation till complete recovery from *musth* events are documented.

KEY WORDS: Elephant, Musth management, Xylazine hydrochloride, Ketamine hydrochloride, Yohimbine hydrochloride.

INTRODUCTION

Adult male Asian elephants (*Elephas maximus*) during sexually active period exhibit a phase of altered behaviour known as *musth*. This is discernable through two physical attributes-secretions from temporal glands and dribbling of urine. There are several other subtle changes in behavior resulting in rise of aggression (Kahl and Armstrong, 2002), restlessness and reduced feeding activities (Poole 1987). Physiologically elevated serum androgen levels have also been reported (Hall-Martin, 1987; Rasmussen and Schulte, 1998).

Elephants in *musth* in captivity are well known for aggression and non-responding to the commands of their keepers. Early detection of *musth* through physical signs/ altered behavior is essential for keeping such elephants restrained during the period. Non detection of *musth* symptom and keeper's negligence often risks the public safety and leads to loss of life and property. We have come across three such cases of *musth* incidences wherein it was essential to restrain the animal for the public safety. We used chemical immobilization technique for restraining such animals and subsequent management of *musth* in post-restraint period. The present paper deals with drug choices, their efficacy and management experiences for handling such elephants in three different stages of *musth* at three different sites.

MATERIALS AND METHODS

Case 1: A captive *Makhna* (Tusk less bull elephant) 29 yrs of age at Jaldapara Wildlife sanctuary was reported to be in *musth* and had run into the forest. The elephant was not responsive to *Mahout's* command and was aggressive. The animal had dried discharge marks around the temporal. It was decided to chemically restrain and tether the elephant. A total dose of 250 mg of Xylazine hydrochloride and 150 mg of Ketamine hydrochloride were used to sedate the

elephant. The elephant achieved standing sedation and could be easily handled. The limbs were tied and the elephant was tethered on to a tree. The elephant was revived using 50 mg yohimbine hydrochloride given intravenously. The elephants were monitored till full recovery from the drug effect. Micturation and initiation of feeding were indicative of its recovery and self care. The ration provided to the elephant was restricted and the elephant was allowed abundant intake of water and was kept cool by frequent spraying of water. The elephant regained his normal temperament within a week.

Case 2: A captive *makhana* elephant around 40 years of age was brought to Haridwar from Meerut to participate in an annual festival. The elephant was having slight temporal discharge since last two months that was gradually diminishing. The elephant had never shown any signs of *musth* except for temporal discharge throughout his life. It was reported that the elephant was exhibiting prolonged periods of penile erection along with stereotypic movements of head and whip like trunk movements and behavioral alteration since a week. Two days prior to veterinary intervention the elephant was aggressive and had charged Mahout. The elephant turned violent and chased and bashed mahout and also broke adjacent structures. The elephant was successfully restrained using 400 mg of xylazine hydrochloride and 100 mg of ketamine hydrochloride. The elephant ran for about 100 meters and came to a halt. Reduced ear, tail and trunk movements along with relaxation of penis and snoring were indicative of desired level of sedation. The elephant was chained and rehabilitated similar to the previous case. The elephant regained normal temperament within 10 days. The situation could thus be mitigated.

Case 3: A 32 year old captive *makhana* elephant was reported to be in *musth* and had become threat to life and property. The elephant had been temporarily kept in a compound along with a cow elephant within the heart of Saharanpur city. The animal was exhibiting slight temporal discharge since a week, frequent penile erection, dribbling of urine, stereotypic movements of head three days prior to veterinary intervention. The elephant had also tried mounting the cow elephant on three different occasions since morning however failed to establish sexual congress. The animal was also not responsive to Mahout's commands and had charged mahout a day prior to the veterinary intervention. The elephant was chemically restrained using 600 mg of xylazine hydrochloride and 150 mg of ketamine hydrochloride and secured to a tree. The above mentioned rehabilitation procedures were followed and the elephant regained normal temperament within 15 days.

In all the three cases the drugs were remotely injected using Dist-inject aluminum dart with 63 mm long collared needle and employing Dist Inject model 60 N projectors. Yohimbine hydrochloride and Atipamezole hydrochloride was used as an antidote for xylazine. This technique of chemical immobilization was not used as treatment for *musth* in elephant but was used as one of the methods of mitigating the problem by securing the animal so that it does not become a threat to life and property. The details of induction time, sedation time and recovery are tabulated below.

Table 1. Drug dosages used in managing elephants in *musth* on different occasions

| Sr No. | Location/ Estimated weight/ Age | Month/Year | State of Musth | Xylazine HCl (mg) | Ketamine HCl (mg) | Induction time | Sedation time | Antidote | Recovery time |
|--------|----------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------|-------------------|------------------|---------------------|------------------|
| 1 | Jaldapara/ Makhana 3000 kgs/ 29 yrs | December 2002 | Almost dried up temporal discharge, animal not responsive to commands and showing some degree of aggression (Post musth period) | 250 (0.08 mg/kg) | 15 (0.05 mg/kg) | 17 min | 50 min | Yohimbine 50 mg | 3 min |
| 2 | Jwalapur/ Makhana 3000 40 yrs | July 2004 | Diminishing temporal discharge, exhibiting prolonged periods of penile erection along with stereotypic movements of head, ear and whip like trunk movements, behavioral alteration (End of mid musth) | 400 (0.13 mg/kg) | 100 (0.03 mg/kg) | 7 min | 27 min | Yohimbine 40 mg | 8 min |
| 3 | Saharanpur/ Makhana 3500 32 yrs | November 2004 | Slight temporal discharge, frequent penile erection, dribbling of urine, stereotypic movements of head and non responsive to Mahout's commands. (Mid musth period) | 600 (0.17 mg/kg) | 150 (0.04 mg/kg) | 8 min | 40 min | Atipamezole 30mg | 2 min |

Induction time: Time of darting to time animal showed first signs of sedation

Sedation time: Time when animal showed first time of sedation to giving of the antidote

Recovery time: Time when animal injected antidote till it regained consciousness

RESULTS AND DISCUSSION

The phenomenon of Musth has been recognized for centuries as a natural behavior among healthy adult male elephants between 15-60 yrs of age. The duration and severity of musth varies between individuals and may last from few days to several months. It is characterized by episodes of aggressive behavior and heightened sexual activity; however bulls can breed in and out of musth. In all the three cases presented, the elephants were *makhanas* between age group of 30-40 yrs and in the later stages of musth ranging from mid musth to post musth period. This period seems to be a critical period which needs to be handled with care. All the three elephants exhibited varied signs indicative of musth. (Table 1)

Managing musth in elephants has been one of the most important challenges in captivity. Elephants in musth have been successfully immobilized employing narcotics like etorphine (M-99) or Immobilon (Jainudeen, 1970, Jainudeen *et al.*, 1971, Cheeran *et al.* 2002, Sabapara and Raval, 1993, Sarma and Dutta, 1996). On three occasions, Thakuria and Barthakur (1994) controlled a captive African elephant coming into musth using diazepam and lorazepam.

Xylazine HCl, due to its high therapeutic index, smooth induction and smooth recovery, ability to induce trunk immobilization and excellent analgesic and sedative properties has become a useful drug in elephant practice (Bongso, 1980, Schmidt 1983, Fowler, 1986, Nayar *et al.* 1992, Pathak, 1991, Sarma and Pathak, 2001, Nayar *et al.* 2002). The drug has been generally used only as a supportive drug to prolong the period of tranquilization following recovery from initial immobilization employing etorphine hydrochloride (Sabapara and Raval, (*loc. cit.*), Sarma and Dutta, (*loc. cit.*)).

Xylazine has almost similar action as etorphine except for a delayed induction time which has relevance in difficult terrain, dense habitat and personal safety. The drug has been found to be suitable in immobilizing musth elephant as the elephant retain the standing posture enabling satisfactory chaining operation. Dutta and Pathak (1997) successfully used xylazine for immobilizing elephant in musth using a total dose of 700 mg for a 3 ton elephant. Cheeran (1994) commented using Xylazine alone in controlling captive rogues employing 100-120 mg/ton of the drug. Sarma and Dutta (*loc. cit.*) successfully used 500 mg xylazine alone on three different occasions for immobilizing elephants in musth.

Xylazine alone has been reported to have depressant effect on cardiac and respiratory function (Pathak, (*loc. cit.*), Sarma and Pathak (*loc. cit.*)). Ketamine does not have any depressant effect on the cardiovascular and respiratory system but produces muscular tremor and stiffness of the skeletal muscle. Combination of Xylazine and Ketamine minimizes the undesirable effects of both the drugs and has been shown to produce a balanced anesthesia. However, Cheeran *et al.* 2002, Cheeran *et al.* 2003 reported photosensitization in Asian elephant sedated with Ketamine-Xylazine and did not observe as much synergism as has been observed in carnivores.

Sarma and Pathak (*loc. cit.*) in their study also inferred that ketamine could mildly mitigate the hypotension brought about by xylazine, while potentiating its sedative action, hence recommended their use as a combination in elephants. Pathak (*loc. cit.*) tried 100-150 xylazine and 50-100 gm ketamine intravascularly to laterally recumbent elephant in 53 clinical cases and reported that the combination could produce quick, safe and dependable analgesia, anesthesia and muscular relaxation when given intravenously in different surgical conditions affecting elephants. They have also reported recovery without excitement and untoward effect. Similar findings were reported by Nayar *et al.* 1992.

In all the three cases presented, combination of Xylazine hydrochloride and Ketamine hydrochloride were used at an average dose of 0.13 mg/kg and 0.04 mg/kg body weight respectively to achieve effective standing sedation. No adverse effects were noticed. The advantage of using both the drugs in the present case was that the elephants could be handled and chained in a standing posture and the overall dosage of both the drugs could be considerably reduced.

Though the present approach of chemically restraining the elephant was not a remedy for *musth*, it provided effective means of mitigating the problem by securing the animal to avoid any untoward incident.

CONCLUSION

The present study highlights successful restraint of elephant in *musth* on three different occasions using xylazine hydrochloride and ketamine hydrochloride at a dose rate of 0.13 mg/kg and 0.04 mg/kg body weight and its subsequent rehabilitation.

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