Comparative Immobilization of Wild Felids in Thailand

Authors: Lon I. Grassman, Sean C. Austin, Michael E. Tewes, and Nova J. Silvy
Source: Journal of Wildlife Diseases, 40(3) : 575-578
Published By: Wildlife Disease Association
URL: https://doi.org/10.7589/0090-3558-40.3.575
Comparative Immobilization of Wild Felids in Thailand

Lon I. Grassman, Jr., 1,3 Sean C. Austin,1 Michael E. Tewes,1 and Nova J. Silvy 1

1 Feline Research Program, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, MSC 218, 700 University Blvd., Kingsville, Texas 78363, USA; 2 Department of Wildlife and Fisheries Sciences, Texas A&M University, TAMU-2258, College Station, Texas 77843-2258, USA; 3 Corresponding author (email: lon.grassman@tamuk.edu)

Abstract: We immobilized individuals of four free-ranging felid species, leopard cat (Prionailurus bengalensis), clouded leopard (Neofelis nebulosa), Asiatic golden cat (Catopuma temminckii), and marbled cat (Pardofelis marmorata) with ketamine hydrochloride and xylazine hydrochloride (KH-XH) and with tiletamine hydrochloride and zolazepam hydrochloride (TH-ZH) between March 1998 and July 2002. Mean (±SD) dose of KH and XH was 26.51±5.71 mg/kg and 1.89±0.43 mg/kg, respectively (n=25), and mean dose of TH-ZH was 11.61±3.39 mg/kg (n=28). Dose was significantly correlated with induction time (P<0.001) and duration of anesthesia (P<0.05), but not with recovery time. There were significant differences between the drug combinations in time to induction (P<0.03) and time to anesthesia (P<0.01); recovery times were not significantly different. We conclude that immobilization of these felids with TH-ZH and KH-XH is effective and safe, but TH-ZH is preferred because of the smaller volume of drug necessary for sedation, faster time to induction, and absence of prolonged muscle rigidity during anesthesia.

Key words: Asiatic golden cat, clouded leopard, immobilization, ketamine hydrochloride, leopard cat, marbled cat, Thailand, tiletamine hydrochloride, xylazine hydrochloride, zolazepam hydrochloride.

Many studies of wildlife in North America, Europe, and Africa have used ketamine hydrochloride combined with xylazine hydrochloride (KH-XH) and tiletamine hydrochloride combined with zolazepam hydrochloride (TH-ZH) for chemical immobilization of carnivores (Beltran and Tewes, 1995; SilleroZubiri, 1996; Shindler and Tewes, 2000; Witz et al., 2001), but there are few reports of the use of these drugs in Southeast Asia. Rabinowitz (1989, 1990) and Grassman (1999, 2000) used TH-ZH and KH-XH, respectively, for immobilization of leopard cats (Prionailurus bengalensis) and leopards (Panthera pardus) in Thailand. We report on the use of KH-XH and TH-ZH on four free-ranging felid species in Thailand: leopard cat, clouded leopard (Neofelis nebulosa), Asiatic golden cat (Catopuma temminckii), and marbled cat (Pardofelis marmorata).

Animal capture and immobilization occurred between March 1998 and July 2002 in two study areas in northeastern Thailand: Phu Khieo Wildlife Sanctuary, Chaiyaphum Province (16°5′–16°35′ N, 101°20′–101°55′ E), and Khao Yai National Park, Nakorn Ratchasima Province (14°5′–14°15′ N, 101°5′–101°50′ E). These protected areas are characterized by forested hills and mountains with intact carnivore assemblages (Kumsuk et al., 1999; Austin, 2002). The study sites are separated by approximately 250 km.

We set box traps baited with live chickens to capture the cats. Felid weight was visually estimated on first approach to the trap, and an appropriate dose of KH-XH or TH-ZH was loaded into a pole syringe. We mixed or reconstituted drugs in the field to avoid weak or destabilized effects common with premixed drugs (Bull et al., 1996). The KH-XH was combined at a 15:1 ratio for clouded leopards and 12:1 ratio for other felids. Attempted dose of KH-XH was 15 or 25 mg/kg KH (Ketaset®, 100 mg/ml, Fort Dodge Laboratories, Fort Dodge, Iowa, USA, or Calypso®, 50 mg/ml, Gideon Richter, Budapest, Hungary) and 1 or 2 mg/kg XH (Tranquived®, 20 mg/ml, Ben Venue Laboratories, Inc., Bedford, Ohio, USA). The TH-ZH mixture contained equal proportions of TH and ZH. Attempted dose of TH-ZH was 10 mg/kg tiletamine and zolazepam (Telazol®, 100 mg/ml, A. H. Robbins Co., Richmond, Virginia, USA, or Zoletil®, 50 mg/ml, Virbac Laboratories, Carros, France).

Captured felids were injected intramus-
TABLE 1. Mean (±SD) doses and times for induction, anesthesia, and recoverya for ketamine (KH) and xylazine (XH) or tiletamine (TH) and zolazepam (ZH) hydrochloride immobilization of free-ranging felds in Thailand.

<table>
<thead>
<tr>
<th>Species</th>
<th>KH-XH</th>
<th>TH-ZH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (n)</td>
<td>KH dose (mg/kg)</td>
<td>XH dose (mg/kg)</td>
</tr>
<tr>
<td>Prionailurus bengalensis</td>
<td>44</td>
<td>19</td>
</tr>
<tr>
<td>Neofelis nebulosa</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Catopuma temminckii</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Pardofelis marmorata</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

a Induction = time from injection until the head was resting on the trap floor; anesthesia = duration between the time the head was resting on the floor and the time the head was up; recovery = time from head up until standing.
injections; all were judged to be within 80% normal adult body weight and in good physical condition.

Mean TH-ZH dose (±SD) for all cats was 11.61±3.39 mg/kg (n=28), whereas mean KH dosage was 26.51±5.71 mg/kg, and mean XH dosage was 1.89±0.43 mg/kg (n=25). Dose was significantly correlated with induction time (P<0.001) and duration of anesthesia (P<0.05); however, recovery time was not (P>0.5). There were significant differences between the drug combinations on induction time and duration of anesthesia (induction time: t=2.229, 50 df, P<0.03; duration of anesthesia: t=2.524, 50 df, P<0.01), but recovery time was not significantly different (t=1.567, 50 df, P>0.1).

Leopard cats were immobilized with TH-ZH at 12.31±2.77 mg/kg (n=25) and with KH and XH at 27.42±5.55 and 1.93±0.45 mg/kg, respectively (n=19). Leopard cat mean weight was 2.70±0.44 kg (range 1.4–3.6 kg). Leopard cat weights were accurately estimated four times (9%), underestimated six times (14%), and overestimated 34 times (77%), but all estimates were within 17% of actual body weight. Induction times were significantly faster for leopard cats given TH-ZH (t=2.102, 42 df, P<0.04). However, times to anesthesia (P>0.09) and recovery (P>0.75) were not different for the two drug combinations.

Clouded leopards were immobilized with TH-ZH at a mean dose of 10.08±0.49 mg/kg (n=3) and with KH and XH at 19.25±2.95 and 1.55±0.39 mg/kg, respectively (n=3). Clouded leopard mean weight was 13.58±2.88 kg. Weight was underestimated two times (33%) and overestimated four times (67%), but estimates were within 10% of actual weight. There were no significant differences between the drug combinations for parameters measured in clouded leopard immobilizations, possibly because of the small sample size.

Asiatic golden cats were anesthetized with KH and XH at a mean dose of 29.61±3.75 and 2.1±0.14 mg/kg, respectively (n=2). Times for induction of anesthesia and recovery were not recorded for the female Asiatic golden cat because of adverse field conditions prohibiting observation. A marbled cat was anesthetized with KH and ZH at 24.86 mg/kg and 1.74 mg/kg, respectively.

Muscle rigidity was observed in most leopard cats and clouded leopards given KH-XH, and one leopard cat had a convulsion. Convulsions are often associated with the use of KH (Kreeger, 1996). Jessup (1982) reported that 5–10% of free-ranging mountain lions (Puma concolor), bobcats (Lynx rufus), and lynx (Lynx canadensis) exhibited seizure-like activity when immobilized with KH. Similarly, Klos and Lang (1982) found about 5% of zoo felids immobilized with KH had convulsions.

On two occasions, once with KH-XH and once with TH-ZH, leopard cats remained immobilized for very short periods, even though drug dose was adequate and properly administered. Although these cats were slightly overdosed, stress-related factors might have influenced sedation duration. One Asiatic golden cat and the marbled cat remained anesthetized for long periods (252 and 280 min, respectively) and recovered slowly.

The long sedation and recovery periods of the pregnant clouded leopard (approximately 6 hr with KH-XH) might have been because of pregnancy; KH-XH is transferred across the placenta and reaches the fetus at 70% of the levels found in the mother (Muir and Hubbell, 1989), which may explain the large differences between the pregnant and male clouded leopards immobilized with KH-XH. Beltran and Tewes (1995) reported similar differences between pregnant and male ocelots (Leopardus pardalis). In contrast, TH-ZH is not thought to have affected pregnant striped skunks (Mephitis mephitis); Larivier and Messier, 1996) or wolves (Canis lupus; Ballard et al., 1991).

The TH-ZH mean dose of 11.61 mg/kg we used was greater than the dose Shindle
and Tewes (2000) used on ocelots (5.0 mg/kg) and slightly higher than the dose Rabino
nowitz (1990) used on leopard cats (10 mg/kg). The mean dose (26.51 mg/kg) of KH
we used was also higher than the dose Beltran and Tewes (1995) reported for ocelots and bobcats. Depending on the objectives of the research and the duration of anesthesia desired, lower doses could be used.

Both drug combinations were satisfactory in inducing rapid and relatively smooth anesthesia with reasonable recovery times. Beneficial characteristics associated with TH-ZH included lack of muscle rigidity, small volume required for sedation, and shorter induction times; thus, we favor this drug over KH-XH.

This study was supported by the Bosack and Kruger Foundation through the Cat Action Treasury, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, Sierra Endangered Cat Haven, Hexagon Farm, Parco Faunistica La Torbiera, Columbus Zoo, Point Defiance Zoo, and Mountain View Farms Conservation Breeding Centre. Research permission was granted by the National Research Council of Thailand (0004.3/0301) and Royal Forest Department of Thailand. This project was part of the joint PhD program between Texas A&M University-Kingsville and Texas A&M University-College Station. Research methodology was approved by the TAMUK Institutional Animal Care and Use Committee (2003-8-12). This is publication 03-129 of the Caesar Kleberg Wildlife Research Institute.

LITERATURE CITED


KUMSUK, M., K. KREETIYUTANONT, V. SUYANNAKORN, AND N. SANGUANYAT. 1999. Diversity of wildlife vertebrates in Phu Khieo Wildlife Sanctuary, Chaiyaphum Province. Wildlife Conservation Division, Royal Forest Department, Bangkok, Thailand, 124 pp. [In Thai.]


Received for publication 28 August 2003.