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KETAMINE-INDUCED IMMOBILIZATION IN THE AFRICAN SIDENECK TURTLE (*PELUSIOS CASTANEUS*)

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ABSTRACT
Chemical immobilization of six adult African sideneck turtles was carried out using varied doses of ketamine with the view of determining the effective and clinically tolerable dose of the drug in the animal that may be required in zoological medical practice. The turtles were divided into three groups of two animals each. Using the lateral aspect of the thigh muscle, intramuscular injections of ketamine were administered 12.5, 25 and 50 mg/kg body weight for groups I, II and III, respectively. Stages of immobilization in the turtles were observed and categorized into five stages: I- Partial extension of the head with retraction when touched; II- partial relaxation of the limbs; III- full relaxation of the head and limbs with partial extension of the tail; IV- full extension of the head, limbs and tail with no retraction when touched; and V- complete recovery from anaesthesia (complete regain of routine activities by the turtle). There were no significant differences (P> 0.05) in the time taken for the turtles to attain to all the stages across the groups. Full recovery from anaesthesia took place 80, 126 and 243 minutes after immobilization for groups I, II and III, respectively. Intramuscular injection of ketamine at 12.5 mg/kg body weight is therefore recommended in chemical immobilization of the African sideneck turtle for routine blood collection and other biometrical and clinical observations. Also, ketamine-induced immobilization at doses higher than 12.5 mg/kg body weight should be avoided in the animal because of the prolonged duration of anaesthesia observed in the study. The information made available by this study is expected to be useful in zoological medical practice.

KEYWORDS: Ketamine, immobilization, turtle, intramuscular, African sideneck turtle.

INTRODUCTION
A number of drugs had been used in reptilian clinical practice with the aim of achieving desirable immobilization, nevertheless but most showed limitations and side effects (Bennett, 1991). Moreover, anesthesia of reptiles is still an imprecise science, compared with birds and mammals, because the results tend to be highly variable, mainly because they are heterothermics (Boyer, 1992). The widespread use of ketamine (class of phencyclidine) in veterinary medicine is due to the fact that it has high safety margin when compared to barbiturates, and because there is the possibility of administration by other routes, in addition to intravenous routes in domestic and wild animal species (Dupras *et al*., 2001; Alves-Junior *et al*., 2012).

The African sideneck turtle (*Pelusios castaneus*) is a freshwater turtle of the family Pelomedusidae, widely distributed in West Africa, occurring from Guinea and Senegal to northwestern Angola (Kirkpatrick, 1995). The *P. castaneus* is a small to medium in size, with relatively extensive plastron that may have a hinge present between the pectoral and abdominal scutes (Olukole *et al*., 2013). They are unable to fully withdraw their heads into their shells, instead drawing it to the side and folding it beneath the upper edge of the shell, and hence are called African sideneck turtles (Olukole *et al*., 2014).
Paucity of information needed on the use of ketamine as anaesthetic in freshwater turtles of African origin led to this study. Hence, immobilization of the *P. castaneus* with ketamine was investigated using varied doses of ketamine with the view of determining the effective and clinically tolerable dose of the drug in the turtle that may be required in zoological medical practice.

MATERIALS AND METHODS
Experimental Animals
Six adult *Pelusios castaneus* (four males and two females) were used for the study. They were bought from local farmers who picked up these turtles at different times in various river drainages in Ibadan, Nigeria. The animals were kept in artificial ponds and were stabilized for 72 hours prior to the investigations carried out. They were fed with commercial fish pellets *ad libitum.* The body weight of the animals was taken with the aid of a Microvar® weighing balance.

Experimental Protocol

The turtles were divided into three groups of 2 animals each while intramuscular injections of ketamine were administered 12.5, 25 and 50 mg/kg body weight for groups I, II and III, respectively. The effects of the immobilization in the turtles were observed and categorized into five stages: I- Partial extension of the head with retraction when touched; II- partial relaxation of the limbs; III- full relaxation of the head and limbs with partial extension of the tail; IV- full extension of the head, limbs and tail with no retraction when touched; and V- complete recovery from anaesthesia (complete regain of routine activities by the turtle). For each of these stages of anaesthesia, the duration was recorded and used to analyse immobilization in the turtle.

RESULTS AND DISCUSSION

Ambient temperature (28-32°C) was taken into consideration during the experimental protocols and was considered optimal since it has been reported that at the interval between 28 and 36°C reptiles have a better functioning of metabolism (Bennett, 1991).

Chemical anaesthesia in reptiles and amphibians had been reported to be difficult due to its varied induction, duration and recovery period as they are usually longer in reptiles and amphibians than mammals (Jayathangaraj and John, 1991). Nevertheless, in the absence of chemical immobilization, the routine methods of restraint in mammals may be more difficult or be associated with much stress and pain in the turtle and tortoise. Chemical anaesthesia in turtle must be safe, rapid and effective for the various procedures that may be indicated in the turtle.

The average body weight of the turtles used for the study was 0.63 kg. The first stage of anaesthesia was observed 15, 12 and 10 minutes after drug administration for groups I, II and III, respectively while the second stage of anaesthesia was noticed 23, 19 and 17 minutes. Full relaxation of the head and limbs with partial extension of the tail (stage III) was observed 35, 30 and 28 minutes after intramuscular administration of ketamine while additional full extension of the tail (stage IV) was observed 53, 45 and 42 minutes post drug administration. Stage IV marked the time taken for full anaesthesia in the turtle. The recovery time was adjured as the time taken for the turtles to regain their normal activities. This occurred 80, 126 and 243 minutes after immobilization. This therefore means that the duration of full anaesthesia in the 12.5 mg/kg body weight group was 27 minutes while those of the 25 and 50 mg/kg body weight were 81 and 201 minutes respectively. A number of drugs tested on Testudines for the induction of anaesthesia have recorded limitations and side effects (Bennett, 1991; Boyer, 1992; Bienzle and Boyd, 1992). Anesthesia of reptiles is still an imprecise science, compared with birds and mammals, because the results tend to be highly variable, mainly because they are heterothermics (Bennett, 1991). The long recovery time experienced in the study confirms previous findings that anesthesia of reptiles is often complicated by the long induction and recovery periods and the difficulty of monitoring parameters (Alves-Junior *et al*., 1992).

CONCLUSION

We conclude that intramuscular injection of ketamine beyond 12.5 mg/kg body weight should be avoided considering the duration of anaesthesia in the animal. Hence, intramuscular injection of ketamine at 12.5 mg/kg body weight is therefore recommended in chemical immobilization of the African sideneck turtle for routine blood collection and other biometrical and clinical observations. The information made available by this study presents data for comparative anaesthesia of freshwater turtles and is expected to be useful in reptilian zoology clinical practice.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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