

Anesthetic Potency of Ketamine in Caspian Terrapin, Freshwater Soft Shell Tortoise and Rat Snake Collected from Bahar Al Najaf District, Al-Najaf Province

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Abstract

The study was carried out during April 2012. Twelve Caspian terrapins, twelve freshwater soft-shell turtles and 6 rat snakes were collected from Bahar Al-Najaf by professional reptiles collectors from Al-Rafidin association for hunting and environment protection, the present study include 3 separated experiments . The terrapins placed in 6 glass aquariums (couple per aquariums) the maintenance conditions controlled after adaptation for one week, all terrapins distributed equally into 3 groups. The animals of group 1, 2 and 3 were injected intramuscularly with 40,60 and 80 mg ketamine .The anesthetic levels were assessed. Freshwater soft-shell turtles experiment, this experiment was same to previous experiment. The rat snakes placed in 2 plastic containers distributed into 2 groups, the maintenance conditions .The snake of 1.2-and3 group were injected with 40, 60 and 80 mg/kg intramuscularly. The anesthetic levels were assessed. We note in Table 1 that when ketamine was injected at a dose of 40, 60 and 80 mg/kg of body weight, the minimum onset time for doses was (15,7,5), while the most time was (17, 10, 5) respectively. While we noticed the minimum a loss of the right reflex, deep anesthesia, recovery right reflex and completed recovery was (21,12,8), (47,58,76), (87,120,140) and (18,24,64) . We note in Table 3 that when ketamine was injected at a dose of 40, 60 and 80 mg/kg of body weight, the minimum onset time for doses was (4,4,3), while the most time was (12, 5, 5) respectively. While we noticed the minimum a loss of the right reflex, deep anesthesia, recovery right reflex and completed recovery was (8,4,5), (50,40,74),(290,260,290) and (62,70,70) .Therefore, the best dose is 80 mg/kg for Caspian terrapin, while for freshwater soft shell tortoise it is 80 mg/kg. As for rat snake, the ketamine dose of 80 mg/kg of body weight was the best according to the study.

Keywords: Anesthetic potency, Caspian terrapin, Rat Snake, Bahar Al Najaf district etc.

Introduction

The necessity of researches about reptile's medicine and surgery has being increasing in recent years, either due to considering reptiles as pet animals or for conservation point ⁽¹⁾. The reptiles are difficult to handling and the chemical restrain are necessary to clinical examination, minor surgical operation and biometry recording ⁽²⁾. Ketamine was originally

developed for human use as cheap,injectable and safe anesthetic,these advantages were formed a ketamine to use in all primates,many zoological and exotic animals, and in birds and reptiles ⁽³⁾. Mostly,there are no anesthetic has been approved to use in reptiles in addition to variable anesthetic effects between individuals of the same species have been observed in reptile anesthesia studies and have been anecdotally attributed to possible differences in temperature, body size, body condition, sex, stress level, administration route and elapsed time since previous dosing ⁽¹⁰⁾. For these reasons the present study was designed to determined the anesthetic effect of ketamine in variant dose scale in three reptiles species including Caspian terrapin (*Mauremys caspica*), freshwater soft shell turtle (*Rafetus euphraticus*) and rat snake (*Colubridae reptilia*) collected from Bahar Al-Najaf district-Al- Najaf province/Iraq.

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Materials and Method

Collection and maintenance of reptiles: The study was carried out during April 2012. Twelve Caspian terrapins, 12 freshwater soft-shell turtles and 6 rat snakes were collected from Baher Al-Najaf by professional reptiles collectors from Al-Rafidin association for hunting and environment protection, the present study include 3 separated experiments as followings:

Caspian terrapin experiment: The terrapins placed in 6 glass aquariums (couple per aquariums) the maintenance conditions controlled according to (7). After adaptation for one week, all terrapins distributed

equally into 3 groups. The animals of group 1, 2 and 3 were injected intramuscularly (8) with 40, 60 and 80 mg ketamine (5). The anesthetic levels were assessed according (8).

Freshwater soft-shell turtles experiment: This experiment was same to previous experiment. Rat snake experiment: The rat snakes placed in 2 plastic containers distributed into 2 groups, the maintenance conditions (7) approved according to (12,17). The snake of 1.2 and 3 group were injected with 40, 60 and 80 mg/kg intramuscularly in table 3. The anesthetic levels were assessed according (11). All reptiles were released in their natural habit after 2 weeks of experiments.

Results

Table 1: Onset of anesthesia and recovery time induced by the anesthetic agents (ketamine) in 12 Caspian terrapin (mean ± standard deviation)

Dose mg/kg b w	Time of onset (min)	Loss Right reflex (min)	Deep Anesthesia (min)	Recovery right reflex (min)	Completed Recovery (min)
40	17	22	48	90	22
40	16	25	47	87	18
40	15	32	55	98	21
40	16	21	51	95	22
Mean	16	25	50.25	92.5	20.75
60	10	22	60	120	24
60	10	15	58	155	27
60	7	14	64	130	28
60	11	12	60	142	29
Mean	9.5	15.7	60.5	136.7	27
80	5	8	77	150	67
80	4	10	76	140	80
80	5	7	91	155	64
80	5	8	98	145	64
Mean	4.75	8.25	85.5	147.5	69.7

We note in Table 1 that when ketamine was injected 40, 60 and 80 mg/kg of body weight, the minimum onset time for doses was (15,7,5), while the most time was (17,10,5) respectively. While we noticed the minimum a loss of the right reflex, deep anesthesia, recovery right reflex and completed recovery was (21,12,8), (47,58,76), (87,120,140) and (18,24,64).

We note in Table 2 that when ketamine was injected 40, 60 and 80 mg/kg of body weight, the minimum onset time for doses was (12,8,6), while the most time was (16,11,8) respectively. While we noticed the minimum a loss of the right reflex, deep anesthesia, recovery right reflex and completed recovery was (22,18,13), (43,65,74), (95,132,134) and (18,30,55).

Table 2 Onset of anesthesia and recovery time induced by the anesthetic agent (ketamine) in 12 freshwater soft shell turtles (Mean±standard deviation)

Dose mg/kg b w	Time of onset (min)	Loss Right reflex (min)	Deep Anesthesia (min)	Recovery right reflex (min)	Completed Recovery (min)
40	12	22	44	92	18
40	10	28	48	102	20
40	14	32	55	98	25
40	16	25	43	95	20
Mean	13	26.75	47.5	96.75	20.75
60	8	18	65	140	28
60	10	21	74	142	32
60	11	20	70	132	34
60	10	20	76	138	30
Mean	9.75	19.75	71.25	138	31
80	6	19	78	170	55
80	6	13	74	154	64
80	8	15	76	134	62
80	7	13	75	158	60
Mean	6.75	15	75.75	154	60.25

Table 3 Onset of anesthesia and recovery time induced by the anesthetic agents (ketamine) in 6 rat Snakes (mean±standard deviation)

Dosemg/kg b w	Time of onset (min)	Loss Right reflex (min)	Deep Anesthesia (min)	Recovery right reflex (min)	Completed Recovery (min)
40	4	8	55	320	67
40	12	10	60	290	58
40	8	9	50	300	62
Mean	8	9	55	303	62
60	4	5	46	260	72
60	5	6	47	250	70
60	5	4	40	280	76
Mean	5	5	43.5	265	73
80	4	7	78	290	80
80	5	6	74	300	70
80	3	6	76	310	75
80	4	5	75	320	77
Mean	4	6	75.75	305	75.5

We note in Table 3 that when ketamine was injected 40, 60 and 80 mg/kg of body respectively. While we noticed the minimum a loss of the right reflex, deep

anesthesia, recovery right reflex and completed recovery was (8,4,5), (50,40,74), (290,260,290) and (62,70,70).

Discussion

A safe and effective anesthetic protocol for the care of turtles, and in particular of the Caspian Pond turtles, is really important, and unfortunately, there are not enough studies on the clinical anesthetic effects of drug combinations in these animals. It is important to observe the animal for respiratory and circulatory abnormalities and possible clinical signs of sepsis⁽¹⁾. Drugs eliminated by the kidneys such as ketamine are not justified in reptiles with a renal dysfunction. Samples from faeces, aspirates, tracheal fluids or blood can help in making an accurate pre-anesthetic diagnosis. There have been various studies that have evaluated the efficacy and side effects of different drug combinations, such as ketamine in turtle *Podocnemis expansa*,⁽⁴⁾ ketamine in tortoises *Gopherus polyphemus*,⁽⁶⁾ and ketamine in Snapping turtles *Chelydra serpentina*.⁽⁷⁾

Ketamine hydrochloride is an anesthetic and analgesic drug that has been widely used in both human and veterinary medicine, especially in tortoises,⁽⁸⁾ and the appropriate dose of the drug for the anesthetization of these animals. The importance of anesthetic and analgesic drugs for the animal medical cares has previously been described,^(1,2) such as the importance of the studies about the efficacy and efficiency of the drugs on the animals. To select the best anesthetic protocol, for any patient, the key elements are efficacy, safety, and reliability. An effective protocol provides for a rapid and smooth anesthesia induction as well as a fast and optimal recovery. Furthermore, the optimal anesthetic agent has a rapid onset of action and is quickly cleared from the bloodstream and central nervous system.

Ketamine hydrochloride is a general anesthetic agent characterized by analgesia^(11, 6), rapid induction, and limited duration of action. The analgesic action of ketamine is due to its ability to bind the N-methyl-D-aspartate subtype of glutamate receptor⁽¹⁶⁾. In snakes, inadequate handling was also reported to induce a fatal myositis^(18, 20). In our experiments, we demonstrated, for the first time, on the terrapin that the time needed to reach anesthesia [Table 1, 2, 3], using ketamine hydrochloride. We note in Table 1 that when ketamine was injected 40, 60 and 80 mg/kg of body weight, the minimum onset time for doses was (15,7,5), while the most time was (17,10,5) respectively. While we noticed the minimum a loss of the right reflex, deep anesthesia, recovery right reflex and completed recovery was (21,12,8), (47,58,76), (87,120,140) and (18,24,64). We

note in Table 3 that when ketamine was injected 40, 60 and 80 mg/kg of body weight, the minimum onset time for doses was (4,4,3), while the most time was (12,5,5) respectively. While we noticed the minimum a loss of the right reflex, deep anesthesia, recovery right reflex and completed recovery was (8,4,5), (50,40,74), (290,260,290) and (62,70,70).

Furthermore, the measurements of the recovery time followed the same trend [Table1]. In fact, as summarized in Table 1, the onsets of anesthesia, Loss Right reflex, Deep anesthesia, recovery right reflex, completed recovery were found to be, in animals treated with the ketamine hydrochloride. There was evidence that the measurements of efficacy differed between doses. East African reptiles 40-60 mg/kg I.M. or S.C. < 50 mg/kg ~ sedation > 50 mg/kg ~ anesthesia⁽¹¹⁾. Monitor lizards 50-100 mg/kg I.M. Results from these type of studies are increasingly in bodies (except royal python) Snakes 50-75 mg/kg I.M. Ketamine not sufficient, Chelonians 40-90 mg/kg I.M. surgical anesthesia⁽¹⁹⁾. Therefore, the best dose is 80 mg/kg for Caspian terrapin, while for freshwater soft shell tortoise it is 80 mg/kg. As for rat snake, the ketamine dose of 80 mg/kg of body weight was the best according to the study.

Conclusions

The Caspian terrapin, freshwater soft shell turtles and rat Snakes are an important species of turtles and reptiles, whose conservation status has not yet been evaluated that still needs to be studied under different point of views and for which an anesthetization protocol has to be fully evaluated. This research has shown that the ketamine is the anesthetic with the fastest onset time and shortest recovery time compared to the doses. These results provide new and important information for the medical treatment of an animal species, which is yet to be sufficiently studied. pertinent due to the effect of climate and environmental changes, currently impacting the worldwide turtle populations.

Conflict of Interests: The authors of this paper declare that he has no financial or personal relationships with individuals or organizations that would unacceptably bias the content of this paper and therefore declare that there is no conflict of interests.

Source of Funding: The authors have no sources of funding, so it is self-funding research.

Ethical Approve: We declare that the study does not need ethical approval.

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