

Clinical Evaluation of Xylazine and Dexmedetomidine as a Preanaesthetic with Tiletamine-Zolazepam Anaesthesia in Dogs

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ABSTRACT

The present clinical study evaluated the dose-sparing effects, maintenance anaesthetic requirements, the quality of sedation, induction, maintenance anaesthesia and recovery following xylazine and dexmedetomidine premedication in dogs undergoing tiletamine-zolazepam anaesthesia. A total of 12 dogs were presented for major surgical procedures. They were randomly divided into two groups: Group I received xylazine (@ 1 mg/kg BW, I/M) and Group II received dexmedetomidine (@ 0.01 mg/kg BW, I/M), followed by intravenous induction with tiletamine-zolazepam (@ 3 mg/kg BW) and maintenance with the same at one-half of the induction dose. Both alpha-2 adrenergic agonists produced similar fair-grade sedation. Premedication with xylazine showed a better, dose-sparing effect than dexmedetomidine. Anaesthetic depth was stable, reflex responses were adequately suppressed and recovery was excellent in all dogs and significantly longer recovery time was observed in group II than group I. Overall, xylazine-tiletamine-zolazepam offered superior results in terms of intubation ease, muscle relaxation and complications than the dexmedetomidine-tiletamine-zolazepam combination.

Key words: Dexmedetomidine, Dogs, Preanaesthetic medication, Tiletamine-zolazepam, Xylazine.

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INTRODUCTION

Anaesthesia, derived from the Greek term “*anaesthesia*” meaning absence of sensation, refers to a reversible loss of sensory perception, either locally or throughout the body (Thurmon and Short, 2007). General anaesthesia is a controlled, reversible depression of the central nervous system resulting in reduced sensory awareness, motor activity and autonomic reflexes. In veterinary practice, anaesthesia may be achieved using injectable or inhalation agents. Total intravenous anaesthesia (TIVA), employing only IV drugs, is particularly useful in small animal practice where equipment or personnel are limited and reduces exposure to waste anaesthetic gases. TIVA involves an initial loading dose followed by intermittent boluses or continuous infusion (Raffe, 2020). As no single drug provides unconsciousness, analgesia and muscle relaxation, balanced anaesthesia using combinations of agents at lower doses is preferred. Preanaesthetic medications enhance sedation, provide analgesia and reduce anaesthetic requirements, with α -agonists commonly used for their reliable sedation, analgesia and cardiovascular stability. The present study was aimed to evaluate the dose-sparing and sedative effects of xylazine and dexmedetomidine in combination with tiletamine-zolazepam in dogs. It also assessed the efficacy and safety of these α -agonists as preanaesthetic agents and compared their effects on induction, maintenance of anaesthesia to determine overall anaesthetic suitability.

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MATERIALS AND METHODS

The present clinical study was conducted in 2025 at the Department of Veterinary Surgery and Radiology, College of

Veterinary Science & A.H., Kamdhenu University, Junagadh (India). The study included a total of 12 dogs for major surgical procedures and were randomly divided into two groups of six each, irrespective of age, sex, breed and body weight. Dogs were fasted for 12 h before anaesthesia. Group I dogs (n=6) received xylazine (1 mg/kg BW, IM), while Group II (n=6) received dexmedetomidine (0.01 mg/kg BW, IM). After 15 min, anaesthesia was induced in both groups using tiletamine-zolazepam @ 3 mg/kg BW, IV till effect. Maintenance of anaesthesia was achieved with supplemental tiletamine-zolazepam at half the induction dose as required. The quality of sedation (poor, fair, good, excellent; score 1-4), induction (poor, fair, good, excellent; score 1-4), maintenance (Table 1) and recovery (Table 2) was assessed using standard scoring systems described by Dinesh *et al.* (2019). Maintenance quality was evaluated based on jaw tone, palpebral reflex, pedal reflex and eyeball position. It was assessed before induction and every 15 minutes during anaesthesia.

Statistical Analysis

Data were expressed as Mean \pm SE and analyzed using t-test (parametric) and Mann-Whitney test (non-parametric). The differences between more than two data sets within group were performed using one-way ANOVA followed by Duncan's multiple range test. Statistical analyses were carried out using SPSS software.

RESULTS AND DISCUSSION

Quality of Sedation

The mean \pm SE sedation score was 2.00 ± 0.25 in Group I and 1.83 ± 0.30 in Group II, indicating fair-grade sedation with no significant difference between xylazine and dexmedetomidine premedicated dogs. Ravinder (2015) reported superior sedation with dexmedetomidine, which was not observed in the present study. Similarly, while Krimins *et al.* (2012) described deeper sedation with dexmedetomidine-butorphanol protocols, the present

Table 1: Quality of maintenance anaesthesia

Parameter	Score	Description
Pedal reflex	0 (Unacceptable)	Strong response to pedal reflex
	1 (Poor)	Weak response to pedal reflex
	2 (Fair)	Sluggish and occasional response to pedal reflex
	3 (Good)	Very sluggish response to pedal reflex
	4 (Excellent)	Abolished pedal reflex
Palpebral reflex	0 (Unacceptable)	Strong response to palpebral reflex
	1 (Poor)	Intact but weak palpebral reflex
	2 (Fair)	Intact but weak palpebral reflex
	3 (Good)	Sluggish response to palpebral reflex
	4 (Excellent)	Abolished palpebral reflex
Jaw tone	0 (Unacceptable)	Not allowed to open the jaws and tightly closing jaws
	1 (Poor)	Marked resistance to opening of jaws and closing quickly
	2 (Fair)	Moderate resistance to opening the jaws and close quickly
	3 (Good)	Mild resistance to opening of jaws and close slowly
	4 (Excellent)	No resistance to opening of jaws and jaws remain open
Eyeball position	1 (Poor)	No rotation of the eyeball (Centre position)
	2 (Fair)	Slight downward rotation of the eyeball
	3 (Good)	Moderate downward rotation of the eyeball
	4 (Excellent)	Complete ventromedial rotation of the eyeball

Table 2: Quality of recovery

Parameters of recovery	Score	Quality
Excitement, severe ataxia and paddling	1	Poor
Some excitement, moderate ataxia and paddling	2	Fair
No excitement or struggling and mild ataxia on standing	3	Good
No excitement, no staggering and no ataxia	4	Excellent



findings suggest that both α -agonists produced only mild sedation at the fixed doses used.

Induction Dose

In the present study, tiletamine-zolazepam was used for induction in both groups, with mean doses of 2.84 ± 0.26 mg/kg in Group I and 3.38 ± 0.68 mg/kg in Group II. Induction was smooth in all dogs. However, Group II required a slightly higher dose, indicating greater anaesthetic demand with dexmedetomidine, while the lower dose in Group I suggests a dose-sparing effect of xylazine. Similar induction doses have been reported by Ratnu *et al.* (2021) using 2 mg/kg IV with xylazine premedication, Kucharski and Kiełbowicz (2021) at 1 mg/kg, and Lachowska *et al.* (2022) at 5 mg/kg IV following medetomidine-butorphanol premedication.

Induction Quality

Induction quality score was 4.00 ± 0.00 in Group I and 3.50 ± 0.34 in Group II, indicating slightly smoother induction with xylazine premedication. Intubation was successful in all dogs. However, two dogs in Group II exhibited swallowing, salivation, mild jaw resistance, requiring an additional half-dose of tiletamine-zolazepam. Consistent with previous reports (Mwangi *et al.*, 2014), induction was rapid and smooth. Similar to Landry and Maza (2020), occasional airway reflexes were observed, suggesting incomplete suppression of pharyngeal responses with dissociative anaesthetics. Overall, induction was satisfactory in both groups, in agreement with Savvas *et al.* (2005), who also reported smooth induction and easy intubation despite occasional hypersalivation.

Maintenance Dose

The maintenance dose of tiletamine-zolazepam was 1.42 ± 0.12 mg/kg in Group I and 1.60 ± 0.34 mg/kg in Group II. Group I required a slightly lower dose than the preset value, indicating a dose-sparing effect of xylazine, whereas Group II required a marginally higher dose, suggesting a weaker dose-sparing effect of dexmedetomidine. Similar observations were reported by Chandramohan *et al.* (2026), who noted that dexmedetomidine-based combinations provide adequate anaesthesia but do not significantly reduce maintenance dose requirements, supporting the present findings.

Quality of Maintenance Anaesthesia

During maintenance, tiletamine-zolazepam provided a stable anaesthetic plane in both groups (Table 3), with complete abolition of the pedal reflex (4.00 ± 0.00). Similar transient returns of reflex activity reported by Kusolphat *et al.* (2022) and Tiwari *et al.* (2024) have been attributed to momentary fluctuations in anaesthetic depth during prolonged procedures. Palpebral reflex suppression was more pronounced in the xylazine group, while the dexmedetomidine group showed moderate suppression, consistent with reports of Salve *et al.* (2022) and McIver *et*

al. (2023), who noted preservation of protective reflexes, particularly the palpebral reflex. Chandramohan *et al.* (2026) likewise observed retention of palpebral reflexes with dexmedetomidine-tiletamine-zolazepam combinations. Jaw tone remained fully relaxed in both groups, in agreement with Sulekha *et al.* (2024). Eyeball position was predominantly central, with only one transient ventromedial rotation in Group I, similar to Salve *et al.* (2022). Overall, xylazine produced deeper reflex suppression, whereas dexmedetomidine maintained a lighter yet clinically adequate anaesthetic depth. Zalavadiya *et al.* (2024) reported similar findings with propofol-tiletamine-zolazepam combinations in dogs.

Table 3: Mean \pm SE scores of maintenance anaesthesia quality scores at various time intervals in two groups of dogs

Parameter	Time interval	Group I	Group II
Pedal reflex	0 min	0 \pm 0.00	0 \pm 0.00
	5 min	4 \pm 0.00 ^a	4 \pm 0.00 ^a
	15 min	4 \pm 0.00 ^a	3.83 \pm 0.16 ^a
	30 min	4 \pm 0.00 ^a	4 \pm 0.00 ^a
	45 min	3.83 \pm 0.16 ^a	4 \pm 0.00 ^a
	60 min	4 \pm 0.00 ^a	4 \pm 0.00 ^a
Palpebral reflex	0 min	0 \pm 0.00	0 \pm 0.00
	5 min	4 \pm 0.00 ^a	3.2 \pm 0.20 ^b
	15 min	3.6 \pm 0.24 ^a	3.4 \pm 0.24 ^a
	30 min	4 \pm 0.00 ^a	3 \pm 0.00 ^b
	45 min	3.6 \pm 0.24 ^a	3.2 \pm 0.20 ^a
	60 min	4 \pm 0.00 ^a	3.4 \pm 0.24 ^a
Jaw tone	0 min	0 \pm 0.00	0 \pm 0.00
	5 min	4 \pm 0.00 ^a	3.66 \pm 0.21 ^a
	15 min	4 \pm 0.00 ^a	4 \pm 0.00 ^a
	30 min	4 \pm 0.00 ^a	3.83 \pm 0.16 ^a
	45 min	3.83 \pm 0.16 ^a	3.83 \pm 0.16 ^a
	60 min	4 \pm 0.00 ^a	4 \pm 0.00 ^a
Eyeball position	0 min	0 \pm 0.00	0 \pm 0.00
	5 min	2 \pm 0.63 ^a	1 \pm 0.00 ^a
	15 min	1.5 \pm 0.5 ^a	1 \pm 0.00 ^a
	30 min	1 \pm 0.00 ^a	1 \pm 0.00 ^a
	45 min	1 \pm 0.00 ^a	1 \pm 0.00 ^a
	60 min	1 \pm 0.00 ^a	1 \pm 0.00 ^a

Group-I: Xylazine-tiletamine-zolazepam, Group-II: Dexmedetomidine-tiletamine-zolazepam. Means bearing same superscript, (small letter) between group do not differ significantly ($p > 0.05$).

Quality of Recovery

Recovery quality was excellent in all dogs, with identical mean score of 4.00 ± 0.00 in both groups. Recovery was smooth and uneventful, with no excitement, ataxia or complications. These findings are consistent with Koli *et al.* (2021), who reported good recovery following tiletamine-zolazepam anaesthesia with xylazine supplementation and with Chandramohan *et al.* (2026), who documented smooth recovery using dexmedetomidine-based multimodal protocols.

Recovery Time

Mean recovery time was 57.17 ± 8.59 min in Group I and it was significantly longer in Group II (100.00 ± 15.15 min). The

prolonged recovery observed with dexmedetomidine was consistent with Gurung *et al.* (2024), who reported delayed recovery using dexmedetomidine-Zoletil combinations. In contrast, xylazine-based protocols have been associated with smoother and faster recovery (Singh *et al.*, 2024).

CONCLUSIONS

Premedication with xylazine or dexmedetomidine before tiletamine-zolazepam produced mild sedation. Dogs receiving xylazine required lower induction doses and exhibited more consistent muscle relaxation and easier intubation than dexmedetomidine. Both protocols provided rapid, smooth induction and stable maintenance of anaesthesia, with minimal reflex responses. Overall, both protocols were safe and effective, with the xylazine-tiletamine-zolazepam showing better outcomes in terms of muscle relaxation, intubation ease and minimal complications than dexmedetomidine-tiletamine-zolazepam.

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