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INVESTIGATION OF XYLAZINE AND LIDOCAINE HCL FOR EPIDURAL ANESTHESIA IN TEDDY GOAT

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ABSTRACT

This experiment was conducted on 6-12 months old healthy Teddy goats, which were purchased from local market by inducing two different anesthetic treatments (A and B). In treatment A, xylazine was administered randomly to all goats in first week of experiment, while in treatment B lidocaine 2% was administered in all goats after one week interval, in-between last lumbar and 1st sacral epidural space using ordinary hypodermic needle (e.g. 22 gauge, 1-inch). The onset, duration of action and time of recovery of analgesia in each animal were recorded with each treatment after every 5 minutes up to 120 minutes. The data were subjected to statistical analysis using one way analysis of variance (ANOVA) and differences among the treatments were compared by the LSD test. The mean time of induction of analgesia was less in treatment B (6.83 minutes) than in treatment A (11.83). The duration of anaesthesia and its recovery was less in treatment A (77.50 and 89.33 minutes, respectively) than in treatment B (85.00 and 91.83 minutes, respectively). The degree of analgesia was increased after administration of xylazine and lidocaine into epidural space. It was concluded that treatment A produced good analgesic effect as compared to treatment B.

Keywords: analgesia, epidural, lidocaine, sedation, xylazine

INTRODUCTION

Epidural anaesthesia is defined as administration of anaesthetic agents into epidural space (Steagall *et al.*, 2017), because it provides good analgesia in flank, perineal and pelvic region (DeRossi *et al.*, 2017). Whereas, dystocia, prolapse of rectum, prolapse of uterus and posterior udder surgery in female animal, problems would be easier to solve when using epidural anesthesia. In addition, epidural anesthesia is also best for castration in buck through surgical method (Ismail, 2016a).

Xylazine is alpha₂ agonist and it is used for epidural anesthesia in sheep, goat, cow, buffalo, horse and camels (Singh *et al.*, 2005). However, xylazine stimulates the alpha₂ adrenergic receptors of the spinal cord for sedation. Xylazine may produce sedation with a high dose-dependent degree of analgesia, generalized muscle relaxation of central origin, cardiovascular and respiratory depression when administered parentally into the domesticated

animals (Molaei *et al.*, 2010). While, it produces analgesia of the perineal region without the adverse effects such as hypotension, neurotoxicosis, severe ataxia of other locally administered anesthetics, when used epidurally in rams, ponies, cattle, horses and llamas. While, cardio-pulmonary effect of xylazine is very less when epidural route is used as compared to intramuscular route (DeRossi *et al.*, 2003). Lidocaine hydrochloride 2% is the local analgesic drug composed of amino-amide class, which is most commonly used for epidural analgesia in cattle, camel, buffalo, sheep and goats (Ismail, 2016). This analgesic alters the fast voltage-gated by blocking signal conduction in sodium channel of the neuronal cell membrane (Skarda and Tranquilli, 2007). However, it is used alone or in combination with other drugs which produce good analgesia at tail, anus and perineum in ruminants (Ismail, 2016b).

Therefore, this technique was first time compared in Teddy goats. Because a limited research has been conducted on epidural anaesthesia on Teddy goats. Keeping in view

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the importance of subject, the present study was designed to observe analgesic effects after use of xylazine and lidocaine as alone epidural anesthesia in goats.

MATERIALS AND METHODS

This study was performed on healthy goats age ranged from 6-12 months. The study was conducted at the Department of Surgery and Obstetrics, Faculty of Animal Husbandry and Veterinary Science, Sindh Agriculture University, Tandojam. Total 06 healthy Teddy goats purchased from local market of Hyderabad, Sindh were placed in Indoor Patient Ward of the department. Feed and water was provided *adlibitum*. Prior to experiment all animals were thoroughly examined, weighed, de-wormed and vaccinated.

Experimental design

All goats received two different anesthetic treatments such as: Treatment A and B. In Treatment A. xylazine (xylaz, Farvet Laboratories, Holland, 20 mg/ml) at the dose of 0.5 mg kg⁻¹ body weight was administered randomly to all goats in first week of experiment. While, in Treatment B, lidocaine 2% (Xylocaine, Barrett Hodgson Pakistan (Pvt) Ltd, 20 mg/ml) at the dose of 4 mg kg⁻¹ body weight was administered in all goats after one week interval. The anesthetic drugs were administered under aseptic conditions in the last lumbar and 1st sacral epidural space using ordinary hypodermic needle (e.g. 22 gauge, 1-inch). The area of injection was clipped and painted with povidone iodine for aseptic epidural injection. The bevel of needle was directed to cranial side. Once needle was inserted in skin, slowly advanced the needle until first the resistance of the interarcuate ligament over the epidural space was felt. Then the syringe containing the local anaesthetic solution was attached and injected slowly, over at least for 30 seconds.

Analgesic effect

The onset, duration of action and time of recovery after analgesic treatments in each animal were recorded. The analgesia was recorded by needle pricking and pressure from haemostat clamp on hind quarter of animal.

Grading of analgesia

The degree of analgesia was graded as follows (Singh *et al.*, 2005):

0= No analgesia (strong reaction on pin prick)

1= Mild analgesia (weak response on pin prick)

2= Moderate analgesia (occasional response on pin prick)

3= Deep or complete analgesia (no response on pin prick)

Statistical analysis

The data were subjected to statistical analysis using one way Analysis of Variance (ANOVA) through computer software Statistics 8.1. The differences among the groups were compared by the LSD test (Statistics, 2006).

RESULTS AND DISCUSSION

The analgesic effects were observed in this experiment. However, the onset of analgesia was produced within 11.83 and 6.83 (minutes) after epidural administration of xylazine and lidocaine, respectively (Table 1). The onset of analgesia was produced more rapidly by lidocaine as compared to xylazine in all goats. Further analysis showed that the onset of analgesia was significantly different ($P < 0.05$) between the treatments.

Whereas, the duration of analgesia was persisted for 77.50 and 85.00 minutes after epidural administration of xylazine and lidocaine, respectively (Table 1). The duration of analgesia was prolonged by administering of lidocaine as compared to xylazine in all goats. Further analysis showed that the duration of analgesia was significantly different between both treatments.

Furthermore, the time of recovery from analgesia was also recorded after epidural administration of xylazine and lidocaine. The results showed 89.33 and 91.83 minutes recovery after epidural administration of xylazine and lidocaine, respectively (Table 1). The animals were rapidly recovered from analgesia by administering of xylazine as compared to lidocaine in all goats. Further analysis showed no significant difference among treatments for recovery of analgesia.

Pre-treatment (control) means of degree of analgesia were 0.00 and 0.00 before administration of xylazine and lidocaine treatment, respectively. These values were non-significantly different (Table 2).

The degree of analgesia was increased after administration of xylazine and lidocaine into epidural space (Table 2). This increase was statistically significant difference from 15 up to 85 minutes and 10 up to 85 minutes by administration of xylazine and lidocaine administration in high epidural space, respectively. Both analgesic drugs showed their

maximum degree of analgesia at 50 minutes and slowly decreased to 85 minutes. There was no any significant difference found from baseline values after 85 minutes of administration of drugs. There was significant difference for degree of analgesia in the treatments at 10, 35, 40, 65 and 70 minutes after administration of xylazine and lidocaine into epidural space in all goats.

In this study total six goats were used to compare the analgesic effects of xylazine and lidocaine. Each goat received both treatments with one week interval. Both drugs were administered epidurally and results obtained from this experiment are discussed.

In the current study, the onset of analgesia occurred within 11.83 and 6.83 minutes after xylazine and lidocaine administration, respectively. However, the onset of analgesia, was produced more rapidly after administration of lidocaine as compared to xylazine in all goats. Similar findings have also been reported for buffalo (Saifzadeh *et al.*, 2007) and Llamas 15 and 4 minutes after administration of xylazine and lidocaine (Molaei *et al.*, 2010).

The duration of analgesia remained 77.50 and 85.00 minutes after epidural administration of xylazine and lidocaine, respectively. Moreover, the duration of analgesia was longer by the administration of xylazine into the epidural space as compared to lidocaine in all goats. Present results are supported by other researchers who reported that the durations of epidural analgesia in camels were observed at 53.75 and 67.46 minutes after administration of xylazine and lidocaine, respectively (Molaei *et al.*, 2010).

Furthermore, in the current study the recovery from analgesia was observed after

89.33 minutes and 91.83 minutes by administering the xylazine and lidocaine in between epidural space, respectively. Meanwhile, the recovery from analgesia was longer by the administration of lidocaine into the epidural space as compared to xylazine in all goats. The scientists reported that the recovery from analgesia occurred in Llamas within 68.75 and 71.46 minutes (Molaei *et al.*, 2010) and 80 and 90 minutes in goats by the administration of xylazine and lidocaine into epidural space, respectively (Derrossi *et al.*, 2005).

The degree of analgesia increased after administration of xylazine and lidocaine into epidural space in the study. However, the degree was significantly increased from 15 to 120 and 10 to 85 minutes after administration of xylazine and lidocaine into epidural space, respectively. While, maximum degree of analgesia was found at 50 minutes in both treatments after the start of experiment. Moreover, current findings were similar with the results recorded in buffalo calves that the degree of analgesia as 20 to 120 and 0 to 75 minutes after administration of xylazine and lidocaine, respectively (Singh *et al.*, 2005).

The results of current study suggested that, xylazine alone produced good sedative effects as compared to lidocaine alone when injected epidurally. Furthermore, xylazine alone produced slower onset of analgesia but it produced more sedative and analgesic, effects as compared to lidocaine alone. This drug may be used in clinical practice for complete and safe regional sedative and analgesic effects for obstetrical and surgical interventions. However, further studies require investigating optimum dose for particular obstetrical and surgical intervention.

Table 1. Onset, Teddy duration and recovery of analgesia (minutes) before and after epidural administration of xylazine and lidocaine in Teddy goat

Animal No.	Onset (minutes)		Duration (minutes)		Recovery (minutes)	
	Treatment A (Xylazine)	Treatment B (Lidocaine)	Treatment A (Xylazine)	Treatment B (Lidocaine)	Treatment A (Xylazine)	Treatment B (Lidocaine)
1	13 ^b	7 ^b	77 ^b	85 ^b	90	92
2	12 ^b	6 ^b	79 ^b	86 ^b	91	92
3	13 ^b	5 ^b	80	82	93	87
4	11 ^b	7 ^b	75 ^b	84 ^b	86	91
5	10	8	76 ^b	87 ^b	86	95
6	12 ^b	8 ^b	78 ^b	86 ^b	90	94
Mean	11.83 ^b	6.83 ^b	77.50 ^b	85.00 ^b	89.33	91.83
SE	0.47	0.47	1.87	1.78	1.14	1.13

S.E = Standard Error

b = Significant difference between rows (A and B)

Table 2. Degree of analgesia before and after epidural administration of xylazine and lidocaine in goats

Time	Treatment (Xylazine) A	Treatment (Lidocaine) B
	Mean \bar{y}	Mean \bar{y}
0	0	0
5	0	0
10	0.00 ^b	1.00 ^{a,b}
15	1.00 ^a	1.00 ^a
20	2.00 ^a	1.00 ^a
25	2.00 ^a	2.00 ^a
30	2.00 ^a	2.00 ^a
35	3.00 ^{a,b}	2.00 ^{a,b}
40	3.00 ^{a,b}	2.00 ^{a,b}
45	3.00 ^a	3.00 ^a
50	3.00 ^a	3.00 ^a
55	2.00 ^a	2.00 ^a
60	2.00 ^a	2.00 ^a
65	2.00 ^{a,b}	1.00 ^{a,b}
70	2.00 ^{a,b}	1.00 ^{a,b}
75	1.00 ^a	1.00 ^a
80	1.00 ^a	1.00 ^a
85	1.00 ^a	1.00 ^a
90-120	0.00	0.00

a= Significant difference within column

b = Significant difference between rows (A and B) remained

 \bar{y} = S. E for both treatments remained zero.

CONCLUSION

It can be concluded that, xylazine alone produced good sedative effects as compared to lidocaine alone when injected epidurally. Furthermore, xylazine alone produced slower onset of analgesia but it produced more sedative and analgesic effect as compared to lidocaine alone. This drug may be used in clinical practice for complete and safe regional sedative and analgesic effects for obstetrical and surgical interventions. However, further studies require investigating optimum dose for particular obstetrical and surgical intervention.

AUTHOR'S CONTRIBUTION

M. Y. Jakhrani: Conducted research and writeup.

A. N. Tunio: Assisted in write up.

D. H. Kalhor: Data collection and interpretation.

H. Janyario: Proof reading.

Z. I. Rajput: Data analysis.

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