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COMPARATIVE STUDIES ON SEDATIVE AND ANALGESIC EFFECTS OF XYLAZINE AND DETOMIDINE IN GOATS

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ABSTRACT

An experiment was carried out to compare the sedative and analgesic effects of intravenous administration of xylazine (0.1mg/kg) and detomidine (50µg/kg), in six healthy goats (Bari breed). Onset of sedation occurred within 29 ± 3.74 and 55.66 ± 5.57 seconds which lasted for 77.59 ± 4.38, and 85.38 ± 2.76 minutes with xylazine and detomidine, respectively. Skin analgesia occurred within 5.66 ± 3.26, and 12. 83 ± 3.48 minutes and the mean values for duration of analgesia were 40.66 ± 3.32 and 33.5 ± 3.67 minutes after administrations of xylazine and detomidine, respectively. Moderate to deep degree of analgesia was achieved by the administration of xylazine and detomidine. Some side effects like salivation, frequent urination, defecation, tympany, protrusion of the tongue, head drooping and bellowing were observed after administration of xylazine and detomidine. It is concluded that these alpha-2 adrenergic agonists are safe to be used in goats.

Key words: Sedation, goat, analgesia, detomidine, xylazine.

INTRODUCTION

Goat was perhaps one of the first animals to be domesticated by the man**.** Signs of their domestication have been found in excavations of Neolithic sites at Jericho dating from 7000 B**.**C**.** (Alan, 1988). Goat is an animal of developing countries and 90% of goats are found in Asia and Africa**.** Goat has particular importance in livestock due to its unique qualities such as high fertility, short kidding interval and good quality mutton, milk and hair**.**

Surgery on domestic goat can be performed under regional/ local anesthesia after proper sedation. The development of sedatives and analgesics in recent years has greatly contributed to improvement of surgical procedures in veterinary practices**.** Alpha² agonists are potent sedatives, widely used in both large and small animal. They have several useful properties, including rapid onset, reliable and potent effect, reversibility, and analgesia (Mckelvey and Hollingshead, 2003)**.**

Xylazine is a thiazine derivative that has sedative, analgesic and muscle relaxant properties (Paddleford, 1999). It is commonly used for sedation, minor surgical and diagnostic procedures (Thurmon *et al*, 1999). Detomidine (dormosedan) is a synthetic alpha² adrenoreceptor agonist with sedative and analgesic properties (Anonymous, 1996)**.** It is imdazole derivative, which has been developed as a sedative/analgesic for domestic animals**.** Detomidine is a non-narcotic, sedative and analgesic producing superficial and visceral analgesia (dose dependent in depth and duration)**.** Profound lethargy and a characteristic lowering of the head with reduced sensitivity to environment stimuli (sound, etc) are seen with detomidine**.** With detomidine administration, heart rate is markedly decreased, blood pressure is initially elevated and then a steady decline to normal is seen in horses (Anonymous, 1996)**.**

Research has been done to study various physiological effects of sedatives and anesthetics in horses (Kalhoro, 1985), in buffalo calves (Al-Shara *et al.,* 2000), in dog and cows (Garcia *et al*.**,** 1991) and sheep (Jam *et al*.**,** 2005, Marais *et al*.,1991), but very limited work has been done in goat (Tunio *et al*.**,** 2003 and Mohammad *et al.*, 1989)**.** Therefore, this research work has been planned to study and compare two different intravenous sedatives in goats under same experimental conditions.

MATERIALS AND METHODS

Selection of animals: Six healthy female goats (Bari Breed) of age between 16-18 months were used to study and compare the sedative and analgesic effects of two alpha² agonists (xylazine and detomidine)**.** All goats were ear tagged with numbers 1-6. During experiment, the animals were kept in the Department of Livestock Management, Sindh Agriculture University Tandojam. The goats were fed green grasses and concentrates. Animals were given acclimatization period of two weeks before the start of experiment and special attention was given to their management.

Treatment Regimen: Two drugs xylazine (0.1 mg/kg I/V, AnaSed, Bayer Corporation, USA) and detomidine (50µg/kg I/V, Dormosedan, Orion Corporation, Finland) were administered to each animal in a criss- cross design for the period of 2 weeks. Prior to administration the juglar vein was located and hairs were clipped over the area. An antiseptic was applied and goat marked 1, 3 and 5 was given xylazine during week 1 and detomidine in week 2. In the similar way goats marked 2, 4 and 6 was given IV injection of detomidine during week 1and xylazine during week one of the experiment.

Parameters studied: The onset and duration of sedation and analgesia were recorded in each animal with each treatment**.** The analgesia was checked by deep pin prick at various body parts. Other clinical parameters like onset of recumbency, salivation, regurgitation, snoring, bellowing, urination, defecation, tympany, jugular pulsation, staggering, arrhythmias, protrusion of tongue, ruminal movements, movements of limb and tail, nystagmus, jaw tone, pedal, palpebral, corneal and swallowing reflexes and animal behavior were noted after administration of drugs in each animal.

Statistical analysis of data: All data obtained were analyzed using the statistical software (Graph Pad Prism USA). Means in each group were compared by Tukey Karmer multiple comparison test.

RESULTS

After xylazine and detomidine administration in goats, the mean values for the onset of sedation were 29 ± 3.74, and 55.66 ± 5.57second and onset of optimal sedation in goats were 5 ± 2.28, and 12.16 ± 2.99 minutes. The duration of optimal sedation were 38.33 ± 3.26 and 34.16 ± 4.62 minutes respectively (Tables 1). The mean values for total duration of sedation were 77.59 ± 4.38 and 85.38 ± 2.76 minutes and total duration of sedation was different.

The mean values for the onset of analgesia in goats were 5.66 ± 3.26 and 12.83 ± 3.48 minutes and the mean values for duration of analgesia were 40.66 ± 3.32 and 33.5 ± 3.67 after administration of xylazine and detomidine respectively (Tables 2). The onset of analgesia was also rapid with xylazine followed by detomidine.

The jaw tone, arrhythmias, jugular pulsation, head movement, muscle relaxation, swallowing reflex, nystagmus, corneal reflexes and movement of limbs were present throughout the sedation period in all animals during the observation period (Table 3).

Table No.1. Onset of sedation, onset of optimal sedation, total duration of optimal sedation and total ration of sedation after administration of xylazine detomidine in goat.

Animal No.	Onset of sedation (seconds)		Onset of optimal sedation (minutes)		Total duration of optimal sedation (minutes)		Total duration of sedation (minutes)	
	Xylazine	Detomidine	Xylazine	Detomidine	Xylazine	Detomidine	Xylazine	Detomidine
1	38	29	8.00	16.00	25	48	75.7	90.45
2	41	41	7.00	13.00	35	60	79.44	82
3	36	37	3.00	9.00	30	56	74	85.3
4	34	36	5.00	811.00	29	62	72	85.2
5	43	32	2.00	9.00	25	58	81.11	84.36
6	38	30	5.00	15.00	30	50	83.3	85
Mean	38.33	34.16	5	12.16	29	55.66	77.59	85.38
S.E	3.26599	4.62241	2.28	2.99	3.74	5.57	4.38	2.76

Table 2. Onset of analgesia and total duration of analgesia after administration of xylazine detomidine in goat

Animal No.	Onset of analgesia (minutes)		Total duration of analgesia (minutes)	
	Xylazine	Detomidine	Xylazine	Detomidine
1	9	16	45	29
2	10	18	40	32
3	3	12	43	38
4	92	9	38	36
5	4	10	36	30
6	6	12	42	36
Mean	5.66**	12.83**	40.66**	33.5**
S.E	3.26	3.48	3.32	3.67

** = Highly significant difference (P<0.01) between xylazine and detomidine

Table 3. Summary of other observation recorded after administration of Xylazine and detomidine in goats.

Clinical Signs	Xylazine	Detomidine
Recumbency	1,4,5,6	1,3,4,5,6
Salivation	All	All
Frequent Urination	All	All
Defecation	5,6	3,6
Staggering	All	All
Muscle relaxation	Present	Present
Snoring	1,2,4,6	1,2,5,6
Bellowing	1,2,5,6	1,2,4,6
Tympany	1,2,3,5,6	1,3,4,5
Pedal Reflex	1, 2, 4	All
Palpebral Reflex	1, 2, 5, 6	All
Swallowing	All	All
Protrusion of Tongue	2,4,5,6	2
Jugular Pulsation	All	All
Ruminal Movement	1,5,6	4,5,6
Head movement	All	All
Tail Movement	1,5,6	6
Jaw Tone	All	All
Nystagmus	Present	Present
Arrhythmias	Present	Present
Corneal reflex	Present	Present
Limb movement	Present	Present

DISCUSSION

This study was designed to compare the sedative and analgesic effects of two alpha-2 adrenergic agonist i.e. xylazine (0.1mg/kg) and detomidine (50μg/kg) administered intravenously in goats and to evaluate the safety.

In this study the mean values for the onset of sedation were 29 ± 3.74 and 55.66 ± 5.57 seconds with xylazine and detomidine respectively. These results are in agreement with others who found dose dependent effect of alpha-2 agonist on the onset of sedation in goats. Jam (2005) observed the onset of sedation at 9.0 ± 1.01 and 11.0 ± 1.01 minutes with 0.2 and 0.3 mg/kg (b.w) of xylazine in sheep respectively. Tunio *et al.,* 2003) reported onset of sedation in 335 ± 16.27 seconds with detomidine (40 μg/Kg) administered intravenously in goats (Pateri breed). This noted difference in the onset of sedation might be due to the dose of drug and breed of goat.

The mean values for the total duration of sedation were 77.59 ± 4.38 and 85.38 ± 2.76 minutes with xylazine and detomidine respectively. Jam *et al.* (2005) reported total duration of sedation as 56.33 ± 1.56 and 63.33 ± 1.68 minutes with 0.2 and 0.3 mg/kg (b.w) of xylazine in sheep. Tunio *et al.*, (2003) observed total duration of sedation 68.83 minutes after intravenous administration of detomidine (40 μg/Kg) in goats. This noted difference in the total duration of sedation might be due to the dose of drug and breed of goat.

Alpha² agonists produce dose dependent duration of sedation in animals. Xylazine and detomidine at the dose rates of 0.1mg/kg and 50 μg/kg produced deep sedation. Tunio *et al*., 2003) reported medium to deep degree of sedation with the similar dose of detomidine in goats. This noted difference in the total duration of sedation might be due to the breed of goat.

The mean values for the onset of analgesia were 5.66 ± 3.26 and 12.83 ± 3.48 minutes and the mean values for duration of analgesia were 40.66 ± 3.32 and 33.5 ± 3.67 after administration of xylazine and detomidine in goats respectively. Malhi, (2006) reported analgesia for 6.00 ± 1.76 minutes after intravenously administration of xylazine at the dose rate 0.2 mg/kg in sheep, Tunio, *et al*., (2003), reported onset of analgesia within 22.66 minutes after administration of detomidine (40 μg/kg), which lasted for 10 minutes in goats. This difference indicate the onset and duration of analgesia might be due to the breed of goat.

The common side effects produced by alpha-2 adrenergic agonists i.e. xylazine and detomidine were salivation, staggering, frequent urination, defecation, head drooping, wobbling, snoring and bellowing. Others have also reported various side effects with respectively. Ali *et al*., (1989) reported frequent urination and defecation after administration of xylazine in camels. Head drooping with detomidine had also been reported by others, in horses (Jochle 1989; Jochle *et al*., 1989), in sheep (Singh *et al*., 1994, Malhi, 2006). Tunio *et al*., (2003) reported similar findings, when he used detomidine 40 μg/kg, 50 μg/kg and 60 μg/kg in goats. These differences might be due to the dose of drug and breed of goat and also due to species of the various domestic mammals.

It is concluded that xylazine, and detomidine are safe to be used in goats in field as well as hospital conditions. These drugs produce a rapid and reliable sedation and analgesia in the goats.

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