International Journal of Animal and Veterinary Advances 2(2): 37-42, 2010
ISSN: 2041-2908

Submitted Date: September 22, 2009 Accepted Date: October 17, 2009 Published Date: April 15, 2010

The Influence of Environmental Temperature on Physiological Parameters in Xylazine Sedated Sheep

[1]M.S. Ismaila, [1]K.I. Onifade, [1]B.M. Agaie, [2]A.T. Elsa and [2]U.M. Chafe
[1]Department of Physiology and Pharmacology, Faculty of Veterinary Medicine, Usmanu Danfodiyo University Sokoto, Nigeria
[2]Department of Veterinary Medicine, Surgery and Theriogenoloy, Faculty of Veterinary Medicine, Usmanu Danfodiyo University Sokoto, Nigeria

Abstract: The influence of environmental temperature on rectal temperature, respiratory rate, heart rate, and rate of ruminal movement were evaluated in xylazine sedated sheep. Xylazine was administered intramuscularly to six matured and healthy yankasa sheep at the dose rate of 0.25, 0.50 and 0.75 mg/kg at low and high environmental temperature of (18ºC±0.87) and (37ºC±1.41) respectively. In each of the dose used, rectal temperature, respiratory rate, heart rate and rate of ruminal motility were measured before drug administration and at interval of 15 min after drug administration up to 210 min. Rectal temperature, heart rate, and ruminal motility decreases significantly ($p<0.05$) 15 min after the drug administration dose-dependently in all the two different environmental temperature conditions. However, the respiratory rates increases significantly ($p<0.05$) but also dose-dependently. The results from this study show that the decrease and increase in these parameters were more pronounced in the lower than in the higher environmental temperature condition. This study indicates that environmental temperature influences the action of xylazine on physiological parameters in sheep.

Key words: Environmental temperature, physiological parameters, xylazine, yankasa sheep

INTRODUCTION

Environmental temperature is a primary factor limiting the growth, reproduction, and survival of all animals and plant life. States of health and disease are the expression of the success or failure experienced by the organism in its effort to respond adaptively to environmental challenges (Dubos, 1965).

There is evidence that high ambient temperature (heat stressor) increases impulse traffic in sympathetic fibers (Bini *et al*., 1980). The enhancement of sympathetic activity by high ambient temperature is also reflected in increase in a number of sympathetically mediated functions, such as heart rate (Arya *et al*., 1997), power of physiological finger tremor (Arya *et al*., 1997), sensitivity to eccrine sweat glands to intradermally injected carbacol (Banjar *et al*., 1987) and rate of redilatation of the pupil after the cessation of a light stimulus (Leung *et al*., 1992). Although it has been shown that some parasympathetically mediated functions (e.g., amplitude of the papillary light reflex responses (Leung *et al*., 1992), salivary output (Arya *et al*., 1997) remain unaffected by the heart stressors, little is known about the effect of these variables on parasympathetically mediated cardiac functions.

Xylazine anesthetic action was linked to the stimulation of central α_2-adrenergic receptors (Hsu, 1981; Clough and Hutton, 1981). Current opinion is that xylazine exerts its central effect at alpha-2-adrenergic receptors (Hedler *et al*., 1981). Central alpha-2-receptors may tonically inhibit nor-epinephrine release with the result that their blockade potentiates the release of the transmitter substance (Bolme *et al*., 1974). Xylazine has been shown to produce cardiovascular depression in sheep following intravenous administration (Aziz and Carlyle, 1978) and has been associated with a dose related increase in respiratory rates in sheep (Aziz and Carlyle, 1978), decrease in horses (Clarke and Hall, 1969) and dogs (Hsu, 1983). Alpha-2-agonists are associated with changes in both physiological and hematological parameters in ruminants. Xylazine decreases partial pressure of oxygen in arterial blood (PaO_2) in cattle (DeMoor and Desmet, 1971), goats (Kumar and Thurmon, 1979) and sheep (Doherty *et al*., 1986; Nolan *et al.,* 1986). Administration of these drugs is also associated with bradycardia, hypotension, hypothermia, sedation, inhibition of motor function, mydriasis, and antinociception in animals (Maze and Tranquilli, 1991; French, 1995; MacDonald's *et al*., 1997).

With all these alterations in physiological, hematological and biochemical parameters associated to this class of drugs, little or nothing is known on the effect of environmental temperature on the alteration in physiological, haematological and biochemical

Corresponding Author: M.S. Ismaila, Department of Physiology and Pharmacology, Faculty of Veterinary Medicine, Usmanu Danfodiyo University Sokoto, Nigeria. Tel: +234 8065280614

parameters associated with the use of this drug. This study therefore is focused on the influence of environmental temperature on the physiological parameters of sheep under xylazine sedation.

MATERIALS AND METHODS

The study was carried out in the department of physiology and pharmacology, faculty of veterinary medicine Usmanu Danfodiyo university Sokoto. Sokoto state is located in the extreme North-western part of Nigeria, lying in between latitude 13ºN and longitude 3ºE and 15ºE of the Greenwich and between 4ºN and 14ºN of the equator. It covers approximately an area of 56,000 km^2 (Anonymous, 2001). There are two major seasons, the wet and dry seasons. The dry season starts from October and last up to April. But in some parts may extend up to May. The mean annual rainfall ranges between 500 and 1,300 mm. Hamattan, a dry, cold and fairly dusty wind is experience in the state between November and February (Kawal and Knabe, 1972).

Six stabilized *yankasa* rams were used for the two different treatment groups. Experiment A was conducted in the cold dry season between the months of December and January 2007/2008 when the mean environmental temperature was 18ºC±0.87, while experiment B was conducted in the hot-dry season between the month of April and May 2008 when the mean environmental temperature was 37ºC±1.41. In the Low Environmental Temperature treatments (LET), Xylazine HCl, was administered intramuscularly at the dose range of 0.25, 0.50 and 0.75 mg/kg to six rams at an interval of one week per dose. Rectal temperature was measured using a digital thermometer inserted into the anus and left for a minutes. Heart rates were measured using a stethoscope; Respiratory rates was measured by observation of the movement of the thoracic cage also for a minute, while the rate of ruminal movement was measured by applying pressure on the rumen for 2 min in cycles/2 min.

The same procedure was repeated using the same range of doses in the high ambient temperature treatments (HET). Subsequently, temperature, respiratory rate heart rate and rate of ruminal movement where taken at 15min interval after xylazine administration for up to 210 min post administration. However, baseline data on all the parameters to be assessed were earlier taken before xylazine administration. The data obtained were expressed as Mean±SD for six rams and the comparison of means was done by one-way ANOVA with least significant difference at the probability of 5% (Petrie and Watson, 2002).

RESULTS AND DISCUSSION

Rectal temperature: Decreased significantly ($p<0.05$) from the baseline values, significant difference ($p<0.05$) was observed when comparing between treatments in the two different environmental temperature conditions (Table 1).

Respiratory rates: Increased significantly ($p<0.05$) from the baseline values in all the treatment groups (Table 2).

Heart rates: Decreased significantly ($p<0.05$) from the baseline values in all the treatment groups (Table 3).

Rates of ruminal movement: Decreased significantly ($p<0.05$) 15minutes after drug administration in all the treatment groups. Significant difference ($p<0.05$) was observed when comparing between treatments in the two different environmental temperature conditions (Table 4).

The influence of ambient temperature on the effect of XYL has not been previously reported in sheep.

Rectal temperature decreases with time much significantly in LET treatments in this study. Hypothermia was also reported in other studies when XYL and other α_2-adrenoceptor agonists were administered to ruminants. Hypothermia was earlier reported in sheep following administration of xylazine and other α_2-adrenoceptor agonists (Harkens and Woods, 1976; Aziz and Carlyle, 1978; Aminkov and Hubenov, 1995; Nolan *et al*., 1986; Doherty *et al*., 1986; Kojchev *et al*., 1989; Hsu *et al*., 1989; Celly *et al*., 1997), goats (Mohammed and Yelwa 1993; Buhari *et al*., 2008; Gweba *et al*., 2009).

Mogoa (1999) also reported that hypothermia in south African breed of goats administered 0.1mg/kg XYL at LET (14ºC) was more severe than goats treated with the same dose at high ambient temperature (24 and 34ºC) respectively. In the HET treatments, the decrease in rectal temperature was not significant ($p>0.05$). Onifade (2007) suggested that hypothermia observed with detomidine and medetomidine in LET was not present in HET since the high temperature compensates for the drug effects. In this study, similar reasons could be advanced. Low environmental temperature, coupled with hypothermic effects of this group of drugs leads to severe decrease in body temperature which in turn leads to decrease in cardiac output, as a result blood supply to the liver decreases which in turn affects biotransformation of these drugs. The decrease in biotransformation leads to prolong effect of these drugs in low environmental temperature condition.

The significant increase in respiratory rates with time following XYL administration in this study is similar to previous reports in sheep (Harkens and Woods, 1976; Aziz and Carlyle, 1978; Aminkov and Hubenov, 1995; Nolan *et al*., 1986; Doherty *et al*., 1986; Kojchev *et al*., 1989; Hsu *et al*., 1989; Celly *et al*., 1997). It has been suggested that the central depressant action of detomidine, which is also an α_2-agonist might have resulted in slight hypoxia and hypercarbia, leading to sympathetic

Table 1: Rectal temperature (ºC) (Mean±SD) following xylazine administration under low and high environmental temperatures in *yankasa* sheep

	Treatment groups					
Time (min)	1	2	3	4	5	6
0	38.37±0.25	38.23±0.05	38.33±0.23	38.23±0.34	38.72±0.31	38.33±0.23
15	38.18±0.25	38.45±0.05	38.23±0.46	38.07±0.41	37.62±0.55^{+}	38.23±0.46
30	37.62±0.37^{+}	38.13±0.19	37.67±0.49^{+}	37.98±0.45^{+}	36.67±0.96^{+}	37.67±0.49^{+c}
45	37.32±0.32^{+}	37.98±0.41^{+}	37.28±0.49^{+}	37.80±0.40^{+}	36.13±0.86^{+}	37.28±0.49^{+c}
60	37.08±0.44^{+}	38.17±0.23^{a}	37.17±0.50^{+}	37.75±0.50^{+}	35.98±0.88^{+}	37.17±0.50^{+c}
75	37.20±0.24^{+}	38.12±0.19^{a}	36.85±0.44^{+}	37.63±0.23^{+b}	35.83±1.12^{+}	36.85±0.44^{+c}
90	37.35±0.34^{+}	38.23±0.15^{a}	36.92±0.71^{+}	37.62±0.33^{+b}	35.50±0.98^{+}	36.92±0.71^{+c}
105	37.48±0.32^{+}	38.37±0.14^{a}	36.93±0.64^{+}	37.55±0.36^{+b}	34.82±2.52^{+}	36.93±0.64^{+c}
120	37.75±0.45^{+}	38.43±0.15^{a}	37.18±0.66^{+}	37.72±0.38^{+}	35.88±0.98^{+}	37.18±0.66^{+c}
135	38.13±0.20	38.45±0.14	37.47±0.81^{+}	37.87±0.36^{+}	36.22±0.86^{+}	37.47±0.81^{+c}
150	38.20±0.23	38.48±0.12	37.60±0.71^{+}	38.00±0.23^{b}	36.38±0.98^{+}	37.60±0.71^{+c}
165	38.30±0.26	38.48±0.13	37.77±0.54^{+}	38.08±0.22^{b}	36.87±0.86^{+}	37.77±0.54^{+c}
180	38.35±0.27	38.50±0.09	38.15±0.14	38.23±0.30	37.22±0.67^{+}	38.15±0.14^{c}
195	38.35±0.29	38.52±0.15	38.27±0.10	38.35±0.34	37.78±0.61^{+}	38.27±0.10^{c}
210	38.43±0.25	38.58±0.08	38.37±0.18	38.45±0.31	38.20±0.35	38.37±0.18

n = 6, Key: Group 1 = 0.25 mg/kg (LET), Group 2 = 0.25 mg/kg (HET), Group3 = 0.50 mg/kg (LET), Group 4= 0.50 mg/kg (HET), Group 5 = 0.75 mg/kg (LET), Group 6 = 0.75 mg/kg (LET), LET = Low environmental temperature, HET = High environmental temperature

[a]: Significantly different treatment group 1 ($p<0.05$), [b]: Significantly different from treatment group 3 ($p<0.05$), [c]: Significantly different from treatment group5($p<0.05$), [+]: Significantly different from the baseline values ($p< 0.05$)

Table 2: Respiratory rates (cycles/min) (Mean±SD) following xylazine administration under low and high environmental temperatures in *yankasa* sheep

	Treatment groups					
Time (min)	1	2	3	4	5	6
0	26.83±6.11	27.50±1.65	18.83±4.71	32.33±3.93	24.50±4.72	29.67±1.21
15	56.67±24.30^{+}	50.67±3.89^{+}	60.00±30.55^{+}	53.50±15.53^{+}	73.67±18.66^{+}	75.33±12.56^{+}
30	61.50±21.04^{+}	64.50±8.98^{+}	61.67±34.26^{+}	44.83±5.91^{+}	67.00±11.95^{+}	58.83±10.98^{+}
45	49.50±12.57^{+}	43.50±5.92^{+}	56.67±24.01^{+}	41.50±14.92^{+}	57.67±14.79^{+}	55.83±16.75^{+}
60	42.83±12.24^{+}	36.67±2.42^{+}	41.50±24.77^{+}	37.67±11.59^{+}	42.17±13.20^{+}	48.50±9.35^{+}
75	31.33±9.09^{+}	33.67±3.00^{+}	44.33±20.21^{+}	33.00±5.93	34.50±11.59^{+}	37.50±9.44^{+}
90	32.50±8.29^{+}	34.00±2.67^{+}	35.00±21.64^{+}	37.17±2.23^{+}	33.00±9.76^{+}	38.83±5.74^{+}
105	26.00±7.46	32.00±3.08^{+}	29.83±16.83^{+}	37.83±5.27^{+}	26.83±8.89^{+}	33.33±4.08^{+}
120	26.67±5.65	29.50±1.80	31.50±15.46^{+}	35.67±4.46^{+}	28.50±7.37^{+}	33.83±4.79^{+}
135	27.17±5.12	27.67±1.41	25.83±8.23^{+}	33.17±6.31	24.00±3.35	34.17±3.76^{+}
150	25.50±5.79	28.00±1.86	22.83±5.27^{+}	31.83±4.49	25.50±2.17	31.83±3.31
165	26.33±5.89	28.50±1.84	19.83±3.66	31.83±3.13	25.83±3.97	31.17±2.79
180	27.00±5.59	27.33±1.67	19.50±1.38	33.17±2.99	23.50±1.64	31.17±1.72
195	25.83±5.64	28.00±1.65	18.50±3.62	31.67±3.27	22.83±2.93	30.00±1.10

Key: Group 1 = 0.25mg/kg (LET), Group 2 = 0.25mg/kg (HET), LET= Low environmental temperature, Group3 = 0.50mg/kg (LET), HET=High environmental temperature, Group 4= 0.50mg/kg (HET), Group 5 = 0.75mg/kg (LET), Group 6 = 0.75mg/kg (LET)

[+]: Significantly different from the baseline values ($p< 0.05$)

Table 3: Heart rates (beats/min) (Mean±SD) following xylazine administration under low and high environmental temperatures in *yankasa* sheep

	Treatment groups					
Time (min)	1	2	3	4	5	6
0	76.83±6.01	72.83±9.81	76.67±5.92	77.67±11.24	85.67±5.35	79.50±7.42
15	51.00±5.37^{+}	54.00±6.16^{+}	57.67±5.50^{+}	55.00±7.85^{+}	60.67±10.69^{+}	53.50±5.68^{+}
30	60.33±12.55^{+}	56.67±10.42^{+}	56.83±10.09^{+}	59.83±6.18^{+}	65.50±13.37^{+}	47.67±7.23^{+}
45	61.50±7.74^{+}	54.33±9.42^{+}	61.50±7.48^{+}	51.17±6.31^{+}	61.17±5.38^{+}	48.00±9.72^{+}
60	61.33±7.69^{+}	59.50±11.10^{+}	57.67±10.17^{+}	52.50±9.52^{+}	66.33±10.58^{+}	47.33±7.50^{+}
75	61.00±8.34^{+}	61.00±12.52^{+}	58.67±9.65^{+}	63.33±7.94^{+}	63.17±6.43^{+}	58.83±14.74^{+}
90	66.17±10.17^{+}	63.67±8.21	55.33±5.35^{+}	66.50±5.92^{+}	66.33±6.25^{+}	57.33±6.56^{+}
105	68.67±5.96^{+}	67.17±9.26	64.17±11.75^{+}	67.50±8.69^{+}	67.33±4.84^{+}	61.50±7.66^{+}
120	73.50±5.43	68.83±10.76	63.00±9.12^{+}	74.00±5.37	71.00±8.07^{+}	69.33±8.45^{+}
135	77.83±5.88	73.83±10.17	63.83±11.94^{+}	73.33±8.19	70.50±10.93^{+}	70.83±9.79^{+}
150	77.17±5.46	73.17±10.52	68.83±5.34	78.50±9.54	73.00±8.41^{+}	74.00±9.01
165	76.00±5.25	72.67±8.14	76.00±8.02	78.67±14.04	74.67±4.97^{+}	75.17±8.28
180	75.83±5.38	71.67±8.36	78.00±7.18	80.67±12.23	78.50±7.23^{+}	78.00±8.60
195	76.33±5.24	73.00±9.80	76.33±5.96	80.83±10.65	81.50±4.51	79.17±8.08
210	76.67±5.57	73.17±8.38	75.83±6.37	80.17±10.65	82.67±5.57	79.17±7.88

Key: Group 1 = 0.25mg/kg (LET), Group 2 = 0.25mg/kg (HET), LET = Low environmental temperature, Group3 = 0.50mg/kg (LET), HET = High environmental temperature, Group 4 = 0.50mg/kg (HET), Group 5 = 0.75mg/kg (LET), Group 6 = 0.75mg/kg (LET)

[+]: Significantly different from the baseline values ($p< 0.05$)

Table 4: Rate of ruminal movement (cycles/2 min) (Mean±SD) following xylazine administration under low and high environmental temperatures in *yankasa* sheep

	Treatment groups					
Time (min)	1	2	3	4	5	6
0	2.17±0.41	2.83±0.41	2.17±0.41	2.83±0.41	2.17±0.41	2.67±0.52
15	0.50±0.55^{+}	0.17±0.41^{+}	0.50±0.55^{+}	0.17±0.41^{+}	0.17±0.41^{+}	0.00±0.00^{+}
30	0.33±0.52^{+}	1.00±0.63^{+a}	0.00±0.00^{+}	0.50±0.55^{+}	0.00±0.00^{+}	0.00±0.00^{+}
45	0.33±0.52^{+}	1.67±0.52^{+a}	0.33±0.52^{+}	1.00±0.89^{+b}	0.00±0.00^{+}	0.33±0.52^{+}
60	0.67±0.52^{+}	2.50±0.55^{+a}	0.33±0.52^{+}	1.83±0.41^{+b}	0.83±0.75^{+}	1.33±0.52^{+c}
75	1.17±0.41^{+}	2.50±0.55^{+a}	0.17±0.41^{+}	2.33±0.52^{b}	1.17±0.41^{+}	1.83±0.41^{+c}
90	1.33±0.52^{+}	2.67±0.52^{+a}	0.83±0.75^{+}	2.83±0.41^{b}	1.00±0.00^{+}	2.33±0.52^{c}
105	1.33±0.52^{+}	2.67±0.82^{a}	1.33±0.52^{+}	2.83±0.41^{b}	1.17±0.41^{+}	2.67±0.52^{c}
120	2.00±0.00	2.67±0.52	1.50±0.84^{+}	2.83±0.41^{b}	1.17±0.41^{+}	2.67±0.52^{c}
135	2.17±0.41	2.67±0.52	1.83±0.75^{+}	2.83±0.41^{b}	1.83±0.41^{+}	2.67±0.52^{c}
150	2.17±0.41	2.67±0.52	2.00±0.00	2.83±0.41	1.83±0.41^{+}	2.67±0.52^{c}
165	2.17±0.41	2.83±0.75	2.17±0.41	2.83±0.41	1.83±0.41^{+}	2.67±0.52^{c}
180	2.17±0.41	2.50±0.55	2.17±0.41	2.83±0.41	2.00±0.00	2.67±0.52
195	2.17±0.41	2.67±0.52	2.17±0.41	2.83±0.41	2.00±0.00	2.67±0.52
210	2.17±0.41	2.83±0.75	2.17±0.41	2.83±0.41	2.17±0.41	2.67±0.52

Key: Group 1 = 0.25mg/kg (LET), Group 2 = 0.25mg/kg (HET), LET = Low environmental temperature, Group3 = 0.50mg/kg (LET), HET = High environmental temperature, Group 4 = 0.50mg/kg (HET), Group 5 = 0.75mg/kg (LET), Group 6 = 0.75mg/kg (LET)
[a]: Significantly different treatment group 1 ($p< 0.05$), [b]: Significantly different from treatment group 3 ($p<0.05$) [c]: Significantly different from treatment group5 ($p<0.05$)

stimulation and increased respiratory rate (Pawde *et al*., 2002). It was also reported that respiratory rate increase in response to CNS depression to meet the body's requirement of oxygen(Hall and Clark, 1983). But in contrast significant decrease in respiratory rate was observed in other animals using XYL. For example in goats (Kumar and Thurmon, 1979; Mohammed and Yelwa, 1993; Mohammad *et al*., 2001; Onifade, 2007; Buhari *et al*., 2007; Gweba *et al*., 2009) and in cattle (DeMoor and Desmet, 1971; Hsu *et al*., 1981). It was observed however that bradypnoea occur when ever α_2-adrenoceptor agonists are used in animals except in sheep and pigs. Platelets aggregation and pulmonary micro-embolism has also been suggested as possible mechanisms responsible for respiratory changes induced by α_2-agonist in sheep (Eisenach, 1988). It has also been reported that α_2-adrenoceptor agonists like XYL, may affect airway resistance and dynamic lung compliance in sheep (Nolan *et al*., 1986; Hsu *et al*., 1989).

Decrease in heart rates were observed 15 min after administration of XYL; this coincides with decrease observed in many previous studies whenever α_2-adrenoceptor agonists were used in animals (Nolan *et al*., 1986; Hsu *et al*., 1989; Kumar and Thurmon, 1979; Mohammed and Yelwa, 1993; Mohammad *et al*., 2001; Buhari, 2007; Gweba *et al*., 2009). The decrease though transient, was more pronounced and significant when using the higher doses of 0.50 and 0.75 mg/kg during the low environmental temperature treatments (LET). This result is in agreement with that of Onifade (2007) in goats after detomidine and medetomidine administration under the LET treatments. It is however in contrast to that of Mogoa (1999) who reported that there was no significant difference in heart rates between the two different seasonal treatments in South-African goats. This may not be surprising since a low dose of 0.01 mg/kg /IV was used in his study. It has been reported that sensitivity to xylazine varies among different breeds of cattle (Raptopoulus and Weaver, 1984; Trim, 1981).

The decreases in heart rates and increase in respiratory rates observed in this studies were dose-dependent with the higher dose producing significant decrease and increases in both the two parameters respectively. This coincides with previous reports in sheep (Harken and Woods, 1976; Aziz and Carlyle, 1978; Aminkov and Hubenov, 1995; Nolan *et al*., 1986; Doherty *et al*., 1986; Kojchev *et al*., 1989 Hsu *et al*., 1989; Celly *et al*., 1997). The decrease in heart rates has been attributed to the carotid baroreceptor reflex and increase vagal tone as well as generalize centrally induced decrease in sympathetic tone (Benson, 1999).

The rate of ruminal movement almost ceases at 15 min after XYL administration in this study .Similar observation was reported in other ruminants in other studies using XYL and other α_2-agonists (Mohammed and Yelwa, 1993; Onifade, 2007; Buhari *et al.,* 2007; Gweba *et al.,* 2009). Rumeno-reticular atony has been documented as a common occurrence following α_2-adrenoreceptor agonists medication in ruminants (Shorts, 1992). It has been postulated that α_2 –adrenoreceptor agonists such as xylazine or clonidine induced rumen stasis; and it has been observed in this study that the ruminal stasis was more severe during the low environmental conditions. Ruminants under the influence of xylazine are prone to hypoxaemia and this has been linked to the drug and body position (Mitchell and Williams, 1976). It has also been reported that xylazine and clonidine induce inhibition of fore-stomach

contraction in a dose-dependent manner (Toutain *et al*., 1982; Ruckebusch and Allal, 1982; Van Miert and Van Duin, 1991; Nicolson and Osman, 1992).

CONCLUSION

Physiological parameters are routinely monitored in clinical practice; but the consideration of these parameters in relation to season, drug dosage and effects have not been given much emphasis. The results of this study indicates that environmental temperature have influence on the effect of xylazine on physiological parameters. The widely varying average daily ambient temperature across the different months of the year in accordance to the seasons pose a great challenge to the use of this drug. This is due to the fact that it has been established that ambient temperature could significantly affect the outcome of effective doses of this drug, and other members of the group particularly the α_2 – adrenoceptor agonists in cattle and goats (Fayed *et al*., 1989; Mogoa, 1999; Onifade, 2007). This study will serve as a guide to clinicians in choosing the dose of these drugs to be used at different time of the year in order to avoid the risk of severe hypothermia, excessive hypoxia or ruminal stasis in sheep.

REFERENCES

Aminkov, B.Y. and H.D. Hubenov, 1995. The effects of xylazine epidural anesthesia on blood gas and acid-base parameters in rams. Br. Vet. J., 151: 579-585.

Anonymous, 2001. Sokoto State-the seat of the Caliphate. Sokoto State Government Diary, pp: 2-8.

Arya, D.K., R.W. Langley, E. Szabadi and C.M. Bradshaw, 1997. Comparison of the effects of high ambient temperature and clonidine on autonomic function in man. Naunyn-Schmiedeberg's Arch. Pharmacol., 355: 376-383.

Aziz, M.A. and S.S. Carlyle, 1978. Cardiovascular and respiratory effects of xylazine in sheep. Zentralble Veteraer Med., 25: 173-180.

Banjar, W., J. Longmore, C.M. Bradshaw and E. Zabdi, 1987. The effect of diazepam on the responsiveness of human eccrine sweat glands to carbacol: Influence of ambient temperature. Eur. J. Clin. Pharmacol., 31: 661-665.

Benson, G.J., 1999. Anesthesia and Analgesia: Physiologic effects of pharmacologic Agents (fulltext). Retrieved from: http://info.med.yale.edu/yarc/vcs/anesthesiaeffect.htm. (Accessed Date: January 30, 2004)

Bini, G., K.E. Hagbarth, P. Hynniken and B.G. Wallin, 1980. Regional similarities and differences in thermoregulatory motor and sudomotor tone. J. Physiol., 306: 533-565.

Bolme, P., H. Corrodi, K. Fuxe, T. Hokeelt, P. Lidbriuk and M. Goldstain, 1974. Possible involvement of central adrenalin neurons in vasomotor and respiratory control studies with clonidine and its interactions with piperoxane and yohimbine. Eur. J. Pharmacol., 28: 89-94.

Buhari, S., J.B. Adeyanju, A.T. Elsa, K.I. Onifade, A.S. Yakubu, M.A. Umaru and A. Jibril, 2007. Sedative and analgesic effects of cranial epidural administration of xylazine, thiopentone and their combination in sahel goats. The Proceedings of the 44th Annual Congress of the Nigerian Veterinary Medical Association, Delta 2007.

Celly, C.S., W.N. McDonell and W.D. Black, 1999. Cardiopulmonary effects of the α_2-adrenoceptor agonists medetomidine and ST-91 in anesthesized sheep. J. Pharmacol. Exp. Ther., 289(2): 710-720.

Clarke, K.W. and I.W. Hall, 1969. Xylazine, a new sedative for horses and cattle. Vet. Rec., 85: 512-517.

Clough, D.P. and R.R. Hutton, 1981. Hypotensive and sedative effects of an adrenoceptor agonist: relationship to α_1 and α_2 adrenoceptor potency. Br. J. Pharmacol., 73: 595-604.

Demor, A. and P. Desmet, 1971. Effect of Rompun and acid base equilibrium and arterial oxygen pressure in cattle. Vet. Med. Rev., 2-3: 163-169.

Doherty, T.J., P.J. Pascoe, W.N. McDonell and G. Monteith, 1986. Cardiopulmonary effects of xylazine and yohimbine in laterally recumbent sheep. Can. J. Vet. Res., 50: 517-521.

Doull, J., 1972. The effect of Physical environmental factors on drug response. Essays Toxicol., 3: 37-63.

Dubos, R., 1965. Man Adapting. Yale University Press, New Haven, CT, pp: 261.

Eisenach, J.C., 1988. Intravenous clonidine produce hypoxaemia by a peripheral alpha-2-adrenergic mechanism. J. Pharmacol. Exp. Ther., 244: 247-252.

Fayed A.H., E.B. Abdalla and R.R. Anderson, 1989. Effects of xylazine in heifers under thermoneutral or heat stress condition. Am. J. Vet. Res., 50: 151-153.

French, N., 1995 α_2-Adrenoceptors and I_2 sites in the mammalian central nervous system. Pharm. Ther. 68: 175-208.

Gweba, M., K.I. Onifade and O.O. Faleke, 2009. Effects of xylazine sedation on some haematological indices after chloramphenicol pre-treatment in Sokoto red goats. Int. J. Pharmacol., 5(1): 76-80.

Harken, A.H. and M. Woods, 1976. The influence of oxyhaemoglobin affinity on tissue oxygen consumption. Ann. Surg., 183: 130-135.

Hall, L.W. and K.W. Clarke, 1983. Veterinary Anaesthesia. 8th Edn. Baillaire Tindall London, pp: 56-60.

Hedler, L., G. Stamm R. Weitzell and K. Starke. Functional Characterization of central adrenoreceptors by yohimbine diastereomers. Eur. J. Pharmacol., 70: 43-52.

Hsu, W.H., 1981. Xylazine induced depression and its antagonism by alpha adrenergic blocking agents. J. Phamacol. Exp. Ther., 218: 188-192.

Hsu, W.H. 1983. Effect of yohimbine on xylazine-induced central nervous system depression in dogs. J. Am. Vet. Med. Assoc., 182: 698-699.

Hsu, W.H., C.E. Hanson, F.B. Hambrough and D.D. Schaffer 1989. Effects of Idazoxam, tlazoline and yohimbine on xylazine endured respiratory changes and central nervous system depression in ewes. Am. J. Vet. Res., 50(9): 1570-1573.

Kawal, J.M. and A. Knabe, 1972. An Agro-Climatological Atlas of Northern states of Nigeria. ABU Press Ltd.

Kojchev, K., A. Orsag, D. Golemanov, H. Houbenov and B. Aminkov, 1989. Comparative studies on respiratory, blood gas and acid-base changes after neuroleptanalgesia with ROMPUN and ROMSTAR in sheep. Proceedings of the XVII Vedeckej Konferencie Aklivne Zdravie Zvieral, 6-7 Sep., Kosice, Czechoslovakia.

Kumar, A. and J.C. Thurmon, 1979. Cardiopulmonary, hemocytologic and biochemical effects of xylazine in goats. Lab. Anim. Sci., 29: 486.

Leung, N.K.C., C.M. Bradshaw and E. Szabdi, 1992. Effect of high ambient temperature on the kinetics of the papillary light reflex in healthy volunteers. Br. J. Clin. Pharmacol., 33: 458-460.

Macdonald, E., B.K. Kobilika and M. Sheinin, 1997. Gene targeting homing in on α-$_2$-adrenoceptor-sub type function. Trend. Pharmacol. Sci., 18: 211-219.

Maze, M. and W. Tranquilli, 1991. Alpha-2-adrenoceptor agonist; defining the role in clinical anaesthesia. Anaesthesiology, 74: 581-605.

Mitchell, B. and T.J. Williams, 1976. Respiratory function changes in sheep associated with lying in lateral recumbency and sedation with xylazine. J. Vet. Anesth., 6: 30-37.

Mogoa, E.G.M., 1999. Effects of Environmental temperature on pharmacokinetics of and clinical response to xylazine in Goats. Ph.D. Thesis, University of Pretoria, South Africa.

Mohammed, A. and H. Yelwa, 1993. Effects of Xylazine hydrochloride (Rompun) on sokoto red goats. Small Rum. Res., 12: 107-113.

Mohammed, A., I.O. Igbokwe and J.P. Yidawi, 2001. Comparison of clinical and haematological changes following intramuscular administration of xylazine, ketamine or xylazine-ketamine combination to Sahel goats. Nig. Vet. J., 22(2): 14-21.

Nicholson, T. and T.E. Osman, 1992. Inhibition of food intake and rticulo-rumen motility of sheep by the alpha-2-adrenoceptor agonist Clonidine. J. Vet. Med. A., 39: 301-312.

Nolan, A., A. Livingston and A. Waterman, 1986. The effects of alpha-2- adrenoceptor agonist on airway pressure in anesthesized sheep. J. Vet. Pharmacol. Ther., 9: 157-163.

Onifade, K.I., 2007. Pharmacological effects of detomidine, medetomidine and Atipamizole in Sokoto red goats. Ph.D. Thesis, Department of Veterinary Physiology and Pharmacology, Faculty of Veterinary Medicine, University of Ibadan, Ibadan, Nigeria.

Pawde, A.M., G.R.S. Amarpal, G.R. Singh and N.N. Kumar, 1996. Clinicophysiological effect of medetomidine in female goats. Small Rum. Res., 20(1): 95-98.

Petrie, A. and P. Watson, 2002. Statistics for Veterinary and Animal Science. 1st Edn., Blackwell Science Ltd., Oxford, pp: 95-100.

Raptopoulos, D. and B.M. Weaver, 1994. Observations following xylazine administration in steers. Vet. Rec., 114(23): 567-569.

Ruckebusch, U. and C. Allal, 1982. Depression of reticulo-ruminal motor functions through sitimulation of alpha-2-adrenoreceptors. J. Vet. Pharmacol. Ther., 10: 1-10.

Shorts, C.E., 1992. Alpha-2-Agonists Agents in Animals. In: Short, C.E. (Ed.), Sedation, Analgesia and Anesthesia. Veterinary Practice Publishing Company, California USA., pp: 75.

Toutain, P.L., M.R. Zingoni and R.Y. Uckebusch, 1982. Assesment of alpha-2-adrenergic agonists on the central nervous system using reticular contraction in sheep as a model. J. Pharmacol. Exp. Therap., 223: 215-1218.

Trim, C.M., 1981. Sedation and general anesthesia in Ruminants. Calif. Vet., 35(4): 29-35.

Van Miert, A.S.J.P.M. and C.T.M. Van Duin, 1991. Feed intake and rumen motility in dwarf goat. Effects of some α_2-adrenergic agonists, prostaglandins and posterior pituitary hormones. Vet. Res. Comm., 15: 57-67.