Evaluation of Atropine-Xylazine as a Sedative in Buffalo Calves (*Bubalus bubalis*)

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**ABSTRACT:** Twelve experimental trials were undertaken on clinically healthy male buffalo calves. Atropine was administered @ 0.04 mg/kg, IM and xylazine was administered @ 0.04 mg/kg, IM. Following atropine-xylazine administration, a decrease in spontaneous activity was seen in all the animals. Lowering of head was observed in three animals. Hemoglobin reduced significantly at 15 minute after xylazine administration. A significant reduction in mean arterial pressure (MAP) was also seen at 30 and 45 minute after xylazine administration. The pulse pressure increased significantly after 5 minute of xylazine administration. The central venous pressure (CVP) increased significantly at 30 minute and 45 minute of xylazine administration.

**Key words:** Atropine, Xylazine, Sedative, Buffaloes.

**INTRODUCTION** - Xylazine and other α₂-adrenoreceptor agonists are widely used as sedatives for large animals for their chemical restraining. Since these drugs stimulate α₂-adrenoreceptors and thus cause hypotension and bradycardia through vagal mediated reflex, therefore, it becomes essential to administer drugs that reduce or inhibit cardiac inhibitory effects of these drugs. Atropine blocks cardiac vagus and thus inhibits cardiac inhibitory effect of xylazine. So the study was conducted to evaluate atropine as an anticholinergic agent.

**MATERIAL AND METHODS** - Twelve experimental trials were undertaken on clinically healthy male buffalo calves of 7 to 18 months of age and weighing 70 to 110 kg. Atropine was administered @ 0.04 mg/kg, IM and after 15 minute of atropine injection, xylazine was administered @ 0.04 mg/kg, IM. Following protocol of experiment was followed:

| Groups (n=no. of animals) | Drugs used | Parameters investigated |
|---------------------------|------------|-------------------------|
| I (n=6)                   | Atropine-Xylazine | Behavioural changes, rectal temperature, heart rate, respiration rate, haemoglobin (Hb), packed cell volume (PCV), erythrocyte sedimentation rate (ESR), blood/plasma glucose, cholesterol, urea nitrogen, creatinine, total proteins, albumin, calcium, inorganic phosphorus, magnesium, sodium, potassium, chloride, serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), alkaline phosphatase (ALKP) and bilirubin |
| II (n=6)                  | Atropine-Xylazine | Systolic pressure, diastolic pressure, pulse pressure, mean arterial pressure (MAP), central venous pressure (CVP) and electrocardiogram |

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The parameters were investigated at various time intervals after administration of drug(s) as shown in different tables. The statistical analysis of data was done by one-way-analysis of variance and Duncan’s multiple range test (Duncan, 1955).

**RESULTS AND CONCLUSIONS** - A decrease in spontaneous activity was seen in all the animals after xylazine administration. Muzzle, mouth and nostril became dry in all the animals at 17.66±1.744 minute of atropine administration. Urination was observed in all the animals. Mild cutaneous analgesia was seen in all the animals. Three animals assumed sternal recumbency and remained in milk fever posture. After intramuscular administration of atropine followed by xylazine, all the animals became ataxic with a weak time of 21.66±6.373 minute. A slight salivation was seen at 35.00±6.603 minute of atropine administration. Tail and preputial sheath were mildly relaxed at 51.16±2.725 minute. Complete recovery took 161.16±12.327 minute.

The effects of atropine in combination with xylazine on rectal temperature and respiration rate are shown in table 1.

| Parameters (Units) | Before administration of atropine | 15 minute of atropine and before xylazine | 15 minute after xylazine | At recovery from effect of drugs | 24 hours after administration of drugs |
|--------------------|----------------------------------|------------------------------------------|--------------------------|----------------------------------|---------------------------------------|
| Rectal temperature (°C) | 38.01±0.332 | 38.20±0.235 | 38.23±0.224 | 38.20±0.222 | 38.10±0.293 |
| Respiration rate (per minute) | 23±2 | 28±2 | 22±3 | 18±1 | 19±1 |

Means with different superscript vary significantly (p<0.05).

There was no significant change in rectal temperature and respiration rate. The effects of atropine-xylazine combination on haematological parameters are shown in table 2.

| Parameters (Units) | Before administration of atropine | 15 minute of atropine and before xylazine | 15 minute after xylazine | At recovery from effect of drugs | 24 hours after administration of drugs |
|--------------------|----------------------------------|------------------------------------------|--------------------------|----------------------------------|---------------------------------------|
| Haemoglobin (g/dl) | 10.00±0.532 | 9.25±0.442 | 8.33±0.511 | 9.25±0.559 | 9.75±0.512 |
| Erythrocyte sedimentation rate (mm per hour) | 62±4.174 | 66±3.718 | 68±3.156 | 68±3.117 | 63±3.253 |
| Packed cell Volume (%) | 29±2.996 | 26±2.250 | 24±1.807 | 26±1.977 | 28±2.468 |

Means with different superscript vary significantly (p<0.05).
At 15 minute after xylazine administration, Hb concentration reduced significantly. The decrease in Hb relates with PCV which also decreased after xylazine administration. This decrease may be attributed to slight pooling of red blood cells in spleen. A slight reduction in Hb concentration at maximal depth of analgesia was seen in goats pre-medicated with atropine followed by xylazine (Kumar and Thurmon, 1979).

The effects of atropine-xylazine combination on various blood bio-chemical parameters are shown in table 3.

| Parameters (Units) | Before administration of atropine | 15 minute of atropine and before xylazine | 15 minute after xylazine | At recovery from effect of drugs | 24 hours after administration of drugs |
|-------------------|-----------------------------------|------------------------------------------|-------------------------|---------------------------------|--------------------------------------|
| Blood glucose (mg/dl) | 46.45±5.357 | 53.96±5.914 | 54.90±7.393 | 47.10±11.490 | 49.65±5.301 |
| Cholesterol (mg/dl) | 24.70±3.044 | 24.60±2.317 | 24.21±2.189 | 24.25±2.504 | 25.68±1.824 |
| BUN (mg/dl) | 24.16±0.087 | 24.04±0.077 | 25.71±1.723 | 23.97±0.083 | 24.02±0.059 |
| Creatinine (mg/dl) | 2.26±0.066 | 2.33±0.094 | 2.47±0.107 | 2.42±0.151 | 2.33±0.086 |
| Total proteins (g/dl) | 6.38±0.266 | 5.93±0.266 | 5.89±0.181 | 5.74±0.247 | 6.01±0.116 |
| Albumin (g/dl) | 3.15±0.108 | 3.07±0.111 | 3.19±0.111 | 2.98±0.162 | 3.08±0.156 |
| Calcium (mg/dl) | 5.08±0.511 | 5.23±0.467 | 5.02±0.481 | 4.90±0.866 | 4.78±0.526 |
| Phosphorus (mg/dl) | 6.69±0.309 | 5.96±0.411 | 5.81±0.501 | 6.32±0.360 | 6.64±0.617 |
| Magnesium (mg/dl) | 2.55±0.046 | 2.60±0.033 | 2.54±0.041 | 2.44±0.045 | 2.40±0.058 |
| Sodium (mmol/l) | 127.84±4.493 | 129.10±3.827 | 128.61±2.862 | 131.11±3.316 | 127.40±2.955 |
| Potassium (mmol/l) | 5.93±0.147 | 5.66±0.236 | 5.21±0.300 | 5.13±0.135 | 5.40±0.402 |
| Chloride (mmol/l) | 106.28±1.903 | 99.71±1.709 | 101.33±0.878 | 104.04±1.909 | 103.81±0.976 |
| Bilirubin (mg/dl) | 0.06±0.010 | 0.08±0.021 | 0.05±0.012 | 0.03±0.000 | 0.05±0.010 |
| SGOT (U/l) | 33.43±3.231 | 34.62±3.798 | 36.88±2.076 | 33.86±2.285 | 34.29±2.61 |
| SGPT (U/l) | 31.17±2.948 | 28.02±1.659 | 31.40±2.048 | 30.18±2.818 | 31.97±3.17 |
| ALKP (U/l) | 87.16±3.487 | 87.16±3.664 | 88.83±3.187 | 88.00±2.221 | 88.00±2.80 |

Means with different superscript vary significantly (p<0.05).

There was no significant change in any of the blood bio-chemical parameters. However, the chloride level reduced significantly at 15 minute of atropine administration. But this variation was of no clinical significance and the values were within the normal range.

The effects of atropine-xylazine combination on heart rate, pulse pressure, mean arterial pressure and central venous pressure are shown in table 4.

There was increase in heart rate, though non-significantly, after atropine administration which remained within the normal limits even after the xylazine administration. A significant reduction was seen in MAP at 30 minute (123.33±9.024 mm Hg) and at 45 minute (126.33±8.424 mm Hg) as compared to base value (151.00±3.492 mm Hg). However, the pulse pressure showed significant variations, increasing significantly at 5 minute after xylazine administration (8.00±0.516 mm Hg) as compared to base value (6.66±0.421 mm Hg). Peshin and Kumar
Table 4. The effect of IM administration of atropine-xylazine on the heart rate, systolic pressure, diastolic pressure, pulse pressure, mean arterial pressure and central venous pressure Mean values with (±) their respective standard errors (n=6).

| Parameters (Units) | Base | After atropine administration | After administration of xylazine |
|-------------------|------|------------------------------|---------------------------------|
|                   | 5 min | 10min | 5 min | 10min | 15min | 30min | 45min | 60min |
| Heart rate (beats per minute) |       |      |       |       |       |       |       |       |
| Systolic pressure (mm Hg) |       |      |       |       |       |       |       |       |
| Diastolic pressure (mm Hg) |       |      |       |       |       |       |       |       |
| Pulse pressure (mm Hg) |       |      |       |       |       |       |       |       |
| Mean arterial pressure (mm Hg) |       |      |       |       |       |       |       |       |
| Central venous pressure (cm water) |       |      |       |       |       |       |       |       |

Means with different superscripts vary significantly (P<0.05).

(1979) found that xylazine administration in atropinized animals produced a significant reduction in mean arterial pressure, heart rate and respiration rate. Preadministration of atropine did not alter the mean arterial pressure as compared to xylazine alone (Kumar and Thurmon, 1979). The CVP was significantly higher at 30 minute (7.41±0.323 cm water) and 45 minute (7.81±0.411 cm water) of xylazine administration as compared to base value (4.36±0.866 cm water). Kerr et al. (1972) found that in horses within 5 minute of xylazine and atropine sulphate administration intravenously, arterial blood pressure increased significantly for a period of 5 to 60 minute post administration and pulse pressure showed an initial increase after 5 minute of administration and after that it decreased with time. No significant variation in central venous pressure was observed. There were no major changes in the ECG at any stage of the experiment. From the present study it was concluded that atropine offsets the side effects on haemodynamic parameters induced by xylazine.

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