# EFFECTS OF XYLAZINE ON BLOOD GLUCOSE LEVELS IN YOUNG MALE BUFFALOES

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## ABSTRACT

The effects of xylazine on blood glucose level, body temperature, pulse rate and respiratory rates were investigated in six young male buffaloes. The biochemical examination of blood samples obtained at various times before and after administration of xylazine revealed an increase in blood glucose levels that peaked after 30 minutes of injection and gradually decreased to normal values after 24 hours post injection. Pulse and respiratory rates significantly decreased during the sedation period, whereas the body temperature slightly increased. Xylazine at dose of 0.05mg/kg produced a light sedation, whereas deep sedation was observed with 0.01 and 0.15mg/kg doses. Based on these data, it may be inferred that xylazine may have potential for use as a preanesthetic medication to reduce surgical anesthesia and facilitate animal handling

**Key words**: Xylazine; Buffaloe; blood glucose, male

## INTRODUCTION

Analgesic drugs play an important role in the practice of veterinary medicine. Since 1960s, new analgesic agents such as xylazine and others have been introduced for use in animals. These agents are important in alleviation of pain and valuable in facilitating restraint and handling of animals. Several investigators have reported that xylazine induces hyperglycemia and hypoinsulinemia in foals (Robertson *et al.*, 1990) and dogs (Benson *et al.*, 1984). Amouzadeh and Sangiah (1990) reported that the duration of xylazine-ketamine anesthesia was significantly reduced in diabetic rats as compared to those in normal rats. This may be due to enhanced metabolism of xylazine and/or ketamine. However, the influence of xylazine on the blood glucose level of young male buffaloe has not been ascertained. Therefore, this study was conducted to determine the effects of xylazine on serum glucose level of young buffaloes.

## MATERIALS AND METHODS

Six young male buffaloes aged 1-3 years and weighing 100-400 kg, were used in this study. The animals were injected with xylazine hydrochloride intramuscularly in three different doses i.e., 0.05, 0.1 and 0.15mg/kg body weight with a gap of at least 7 days between any two doses. The body temperature, pulse and respiratory rates were monitored at zero time (before dosing) and at 15, 30, 60, and 120 minutes and 24 hours after drug administration. The onset and duration of xylazine action were determined immediately after dosing. The clinical features such as fall and rise of animal, salivation, posture, muscular incoordination, head drooping and corneal and skin pinch reflexes were observed. Blood samples of 5ml were collected from the jugular vein of animals before drug administration (zero time) and at 15, 30, 60, 90 and 120 minutes and at 24 hours after injection. The serum was obtained by allowing blood sample to form a clot and then centrifuged at a speed of 3000 rpm for 10 minutes. The clear serum was separated and kept at -20 $^{0}$C until used. Serum glucose levels were determined using the colorimetric method (Trinder, 1969). The data were subjected to analyses of variance (DMR test) to compare the differences between means values of controls and the means values at different intervals of three different doses.

## RESULTS

After administration of xylazine, the animals were observed continuously for two hours and then 24 hours post injection. The apparent signs noted after i/m injection of three different doses during the course of experiments are summarized in Table 1. Three doses caused the effects to appear at 8, 6.5 and 5 minutes with the doses of 0.05, 0.1 and 0.15mg/kg respectively. The maximum sedation was observed at 30 minutes with all three doses. The total sedation time was 50, 68, and 85 minutes with the doses of 0.05, 0.1 and 0.15 mg/kg respectively. Slight sedation was observed with all doses, whereas deep sedation was observed only with the doses of 0.1 and 0.15

mg/kg at 30-90 minutes post injection in all animals. The pulse and respiratory rates significantly decreased compared to those of controls. Body temperature was slightly increased, whereas the blood glucose levels were significantly increased compared with those of controls (Table 2).

**Table 1:. Frequencies of clinical signs after i/m injection of xylazine with different doses in young male buffaloes (n = 6).**

| Symptom shown | Dose levels | | |
|---|---|---|---|
| | 0.05 mg/kg | 0.10 mg/kg | 0.15 mg/kg |
| Salivation | All | All | All |
| Head drooping | All | All | All |
| Drowsiness | All | All | All |
| Recumbency | - | All | All |
| Skin analgesia | - | - | All |
| Presence of corneal and palpeberal reflexes | all | all | All |

## DISCUSSION

The results of this study indicated that xylazine when administered intramuscularly in young male buffaloes causes sedation and moderate analgesia but the onset of anesthesia was not observed in these animals. These findings are similar with those observed in foals (Carter *et al.*, 1990), cows (Jean *et al.*, 1990) and sheep (Coulson *et al.*, 1989). The lowest time for onset of action was 5 minutes after injection and it was also observed with the higher dose. These findings are similar with that observed in buffaloes (Sharif *et al.*, 1991). Significant decline in the pulse and respiratory rates were noted in all animals with all doses. This decline in the pulse and respiratory rates coincided with the sedation period. These findings are similar with those observed in buffaloes (Tantawy *et al.*, 1982; Kumar and Sharma, 1986; Sharif *et al.*, 1991). Transitory slight increased in rectal temperature was seen during sedation. These findings are in agreement with those observed in buffaloes (Tantawy *et al.*, 1982; Sharif *et al.*, 1991). Xylazine significantly elevated blood glucose levels in buffaloes after i/m injection and this elevation was linear with the doses (Fig. 1). The peak blood glucose levels were observed at 30 minutes after injection with all three doses, and then gradually decreased to normal levels at 24 hours. These finding were similar with that reported in buffaloes (Peshin and Kumar, 1983), cattle (Walter and Hummel, 1981) and sheep (Raptopoulos, 1990). The possible explanation for hyperglycemia is that xylazine may activate $\alpha^{-2}$ adrenergic receptors or inhibit insulin secretion (Berthelsen and Pettinger, 1977). In conclusion, our study reported that xylazine at three different doses provides good sedation in young male buffaloes. Therefore, we suggest that it may be used as preanaesthetic drug, which may result in reducing the dose of surgical anesthesia, and also cause significant elevation of blood glucose levels.

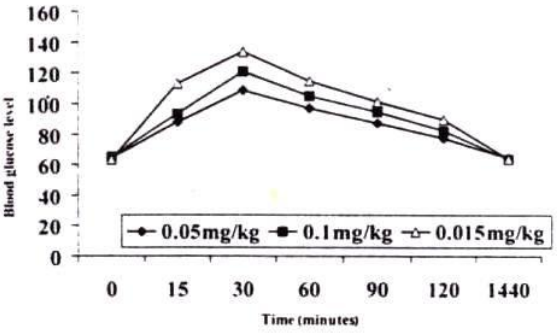


**Fig. 1: Blood glucose levels (mg/dl) in young male buffaloes (n=6) before and after i/m administration of 3 dose levels of xylazine.**

**Table 2: Means of pulse rate, respiratory rate, body temperature and blood glucose levels before (zero time) and after injection of three different doses of xylazine in young male buffaloes (n = 6).**

| Time | Pulse rate/minute | | | Respiratory rate/minute | | | Body temperature (°F) | | | Blood glucose level (mg/dl) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (Minutes) | D1 | D2 | D3 | D1 | D2 | D3 | D1 | D2 | D3 | D1 | D2 | D3 |
| 0 (control) | 48.6 | 49.3 | 48.0 | 23.0 | 22.3 | 23.6 | 100.8 | 101.0 | 100.8 | 64.1 | 64.8 | 63.0 |
| 15 | 40.0 | 37.3 | 36.0 | 15.5 | 11.0 | 7.5 | 101.1 | 101.5 | 101.2 | 87.5 | 93.3 | 112.8 |
| 30 | 37.3 | 35.3 | 32.6 | 10.0 | 8.6 | 6.0 | 101.3 | 101.6 | 101.4 | 108.2 | 120.5 | 133.5 |
| 60 | 38.8 | 36.6 | 34.0 | 14.6 | 11.3 | 7.6 | 101.2 | 101.3 | 101.1 | 97.0 | 104.7 | 114.5 |
| 90 | 42.6 | 40.6 | 41.3 | 17.6 | 13.3 | 10.6 | 101.1 | 101.1 | 100.8 | 87.0 | 94.17 | 101.0 |
| 120 | 43.3 | 42.0 | 41.3 | 18.3 | 15.0 | 13.6 | 100.8 | 101.1 | 100.7 | 77.3 | 82.3 | 89.8 |
| 1440 | 48.0 | 48.0 | 48.6 | 22.3 | 22.3 | 22.6 | 100.9 | 101.1 | 100.8 | 64.5 | 63. 8 | 63.5 |

Note: D1= 0.05mg/kg; D2= 0.10mg/kg; D3= 0.15mg/kg body weight.

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## REFERENCES

Amouzadeh, H.R. and S. Sangiah, 1990. Effects of streptozotocin-induced diabetes on xylazine-ketamine anesthesia. Vet. Hum. Toxicol., 32: 19-22.

Benson, G.I., A.C. Neff-Davis., E.J. Corbin., E.L. Davis., B. Wilkinson and J.W. Tranquilli, 1984. Effects xylazine hydrochloride upon plasma glucose and insulin concentration in adult pointer dogs. J. Am. Anim. Hos. Assoc., 20: 791-794.

Berthelsen, S. andW. Pettinger, 1977. A functional basis for classification of α adrenergic receptors. Life. Sci., 21: 595.

Carter, S.W., S.A. Robertson., C.J. Steel and D. A. Jourdenais, 1990. Cardiopulmonary effects of xylazine sedation in the foal. Eq. Vet. J., 22: 384-388.

Coulson, N.M., A.J. Januszkie., K.T. Dodd and G.R. Ripple, 1989. The cardiorespiratory effects of diazepam-ketamine and xylazine-ketamine anaesthetic combination in sheep. Lab. Anim. Sci., 39: 591-597.

Jean, S.G., R.T. Skarda., W.W. Muir and G.F. Hoffsis, 1990. Caudal epidural analgesia induced by xylazine administration in cows. Am. J. Vet. Res., 51: 1232-1236.

Kumar. A and A.K. Sharma, 1986. Thiopentone sodium with and without xylazine premeditation in buffaloes. Ind. J. Anim. Sci., 56:1022-9.

Peshin, P.K, and A. Kumar, 1983. Haemocytological and biochemical effects of xylazine in buffaloes. Ind. Vet. J., 60: 981-986.

Raptopoulos. D., 1990. The role of hypoxia in the hyperglycemia effects of xylazine in sheep. J. Vet. Med. Ser., 37: 215-219.

Robertson, M.A., S.W. Carter., M. Donovan., and C. Steel. 1990. Effects of i/v xylazine hydrochloride on blood glucose, plasma insulin and rectal temperature in the neonatal foals. Eq. Vet. J., 22: 43-47.

Sharif, M., N.I. Chaudhary., M. Nawaz and M.S. Durani, 1991. Xylazine as a sedative and general anaesthetic in buffaloes. Pakistan Vet. J., 11: 182-186.

Tantawy, M., H. Ibrahim and S. El-Amrusi, 1982. Some clinical studies on xylazine in buffaloes. Assiut. Vet. Med. J., 9: 147-150.

Trinder, P., 1969. Determination of blood glucose using an oxidase-peroxidase system with a non-carcinogenic chromogen. J. Clin. Pathol., 22: 158-61.

Walter, H. and S.K. Hummel, 1981. Xylazine induced hyperglycemia in cattle: a possible involvement of $_{2}$- adrenergic receptors. regulating insulin release. Endocrinol. Am. Vet. Med. Assoc., 109: 825-829.