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HAEMATO-BIOCHEMICAL RESPONSE TO XYLAZINE-PROPOFOL ANAESTHESIA IN DOGS

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Abstract: The study was conducted on five healthy mongrel dogs of either sex, weighing 10-20 kg. Xylazine @1mg/kg was administered intramuscularly 10 min. prior to the injection of propofol @ 4mg/kg in all the dogs. Non-significant decrease in haemoglobin, packed cell volume and total erythrocyte count while non-significant increase in total leucocyte count was observed. The biochemical parameters viz., glucose, BUN, creatinine, AST and ALT showed significant ($P<0.01$) increase upto 35 minutes post anaesthesia however these values returned to near normalcy by 60 minutes.
Keywords: Xylazine, propofol, dogs, anaesthesia.

Introduction

Xylazine is widely used as centrally acting α_2-adrenergic receptor agonist with potent sedative, analgesic and muscle relaxant activity (Pandey *et al*., 1996) and induces profound bradycardia, decreased cardiac output, emesis and depressed thermoregulation. It is commonly used in canine surgery either alone or in combination with other sedative, analgesic or anaesthetic agents (Booth, 1992). Alpha-2 agonists are also capable of potentiating the effects and reducing the dose requirement of barbiturate, volatile anaesthetics, non-barbiturate anaesthetic and narcotic analgesic and can be completely removed. Propofol is a new short acting, rapidly metabolized intravenous anaesthetic agent and characterized by rapid onset, short duration, lack of cumulation on repeated administration and lack of excitatory effects on induction, during maintenance or recovery (Bufalari *et al*., 1995). But is a poor analgesic, and if it is used to maintain anaesthesia, it must be supplemented with an analgesic and a muscle relaxant (Kilic, 2004) such as opioids or α_2-agonists. The present study was performed to evaluate the haemato-biochemical response to xylazine-propofol anaesthesia in dogs.

Materials and Methods

Five healthy mongrel dogs of either sex, weighing 10-20 kg were used for the study. They were kept off feed for 12 hr and water for 6hr before induction of anaesthesia. Xylazine was

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administered @1mg/kg intramuscularly 10 min. prior to propofol @ 4mg/kg intravenously in all the dogs. Blood / serum samples were collected from the animals before (0 min.) and 20 min., 35min., and 60min., post xylazine-propofol anaesthesia for estimation of haematological and biochemical parameters. The data were analyzed as per standard methods by Snedecor and Cochran (1967).

Results and Discussion

Alpha$_2$-adrenoceptor agonist drugs are used primarily for their central effect of profound sedation but they also give analgesia through both spinal and central actions even in subsedative doses. Propofol is a general anaesthetic with minimal analgesic action. Therefore, analgesic drugs such as α_2-agonists like xylazine or opioids are administered concurrently and premedication with tranquilizers or sedatives reduces the dose of propofol required for anaesthesia (Cullen and Reynoldson, 1993). The effects on haematological and biochemical parameters after xylazine-propofol anaesthesia at various intervals are shown in Table 1 and Table 2 respectively. Haemoglobin showed a non-significant decrease at 20 min. after xylazine-propofol anaesthesia and further decreased upto 35 min. The decrease in haemoglobin level might be due to pooling of blood cells in the spleen induced by adrenolytic property of α_2-agonists. Similar findings have been reported by Couto (2003) and Jain *et al*. (2004) in dogs. However, the values returned to near preadministration level by 60 minutes. The packed cell volume showed non-significant decrease 20 min. post xylazine-propofol anaesthesia. The decrease in PCV could be due to increase in plasma volume during anaesthesia on account of vasodilatation resulting in vascular pooling. Kwon *et al*. (1999) and Jain *et al*. (2004) reported similar findings in dogs. The total erythrocyte count (millions/mm^3) showed a non-significant decrease 20 min. post xylazine-propofol anaesthesia and further a non-significant decrease upto 35 min. and then returned to normalcy by 60 min. A non-significant decrease in TEC might be due to pooling of red blood cells in the spleen during early stage of anaesthesia. Similar findings were observed by Kwon *et al*. (1999), Ozaydin *et al*. (2001) and Jain *et al*. (2004) in dogs. A non-significant increase in TLC at 20 min. post xylazine-propofol anaesthesia and further a non-significant increase 35 min. which returned to near control values by 60 min. post anaesthesia. The transient increase in TLC after anaesthesia could be attributed to stress and release of ACTH on account of their administration. Similar findings have also been reported by Gill *et al*. (1996) in dogs.

Serum glucose showed a significant ($P<0.01$) increase at 20 minutes after xylazine-propofol anaesthesia. The rise in glucose level might be attributed to increased hepatic

glucose production, decreased glucose utilization, decreased membrane transport and reduced plasma concentration which are mediated by activation of alpha$_2$-adrenoceptors present in the beta cells of pancreatic islets exerting a negative control of basal insulin release. Similar findings have been reported by David (1992), Bayan *et al*. (2000) and Manat and Kelawala (2004) in dogs. Total serum proteins showed a non-significant decrease at 20 min. post xylazine-propofol anaesthesia. The decrease in total proteins might be due to haemodilution or secondary elevation of globulins since colloidal osmotic pressure is maintained by osmotic mechanism. Similar findings have also been reported by Parikh *et al*. (1995) and Kim-Jiwan *et al*. (1999) in dogs. The SUN values showed a significant ($P<0.01$) increase at 20 min. post xylazine-propofol anaesthesia. However, the values returned to preadministration level by 60 min. The values of creatinine showed a significant ($P<0.01$) increase at 20 min. post xylazine-propofol anaesthesia. The maximum increased value of 1.98±0.03 mg/dl (control value1.37±0.01 mg/dl) at 20 min. post anaesthesia. The increase in serum urea nitrogen and creatinine after xylazine-propofol anaesthesia may be attributed to temporary inhibitory effect of these drugs on renal blood flow and consequent decrease in glomerular filtration rate resulting in increase in their levels. Similar findings have also been reported by Lim *et al*. (2000) and Manat and Kelawala (2004) in dogs. Serum AST showed a significant ($P<0.01$) increase at 20 min. post xylazine-propofol anaesthesia which returned near preadministration level by 60 min. The maximum values recorded was 45.9±0.66 U/L (control value 43.08±0.3 U/L). Serum ALT showed a highly significant ($P<0.01$) increase at 20 min. post xylazine-propofol anaesthesia and returned to near preadministration level by 60 min. The maximum values recorded was 36.5±0.35 U/L (control value 31.36±0.44 U/L). The increase in the AST and ALT activities might be due to alteration in cell membrane permeability in response to haemodynamic changes by the anaesthetic agents. ALT is the liver specific enzyme in dogs and the pathology involving the hepatic parenchyma allows the leakage of large amount of this enzyme in the blood. These results are in agreement with Kim-Jiwan *et al*. (1999) and Bayan *et al*. (2002) in dogs. Thus, results of the experiment indicates that xylazine-propofol anaesthesia can be safely used in canines.

Table 1. Effect on haematological parameters after xylazine-propofol anaesthesia at various intervals in dogs (Mean±S.E.)

Parameters	0 min.	Post xylazine-propofol anaesthesia		
		20 min.	35 min.	60 min.
Hb (gm/dl)	12.76±0.68	11.9±0.67	10.76±0.91	12.52±0.62
PCV (%)	40.8±1.06	38.6±0.67	37.8±0.48	40±0.81
TEC ($\times 10^6$ cu mm^{-1})	5.68±.37	5.36±0.39	5.16±0.409	5.60±0.35
TLC ($\times 10^3$ cu mm^{-1})	11.79±1.03	12.77±0.61	12.91±0.71	12±0.65

Table 2. Effect on biochemical parameters after xylazine-propofol anaesthesia at various intervals in dogs (Mean±S.E.)

Parameters	0 min.	Post xylazine-propofol anaesthesia		
		20 min.	35 min.	60 min
Glucose (mg/dl)	85.06±1.62	106.8±1.06**	112.6±1.07**	93.4±1.07**
Total Serum Proteins (gm/dl)	4.99±0.02	4.76±0.10	4.57±0.02	5.10±0.19
Serum Urea Nitrogen (mg/dl)	20.6±0.43	22.7±0.33**	22.86±0.41	20.82±0.48
Creatinine (mg/dl)	1.21±0.03	1.37±0.04**	1.38±0.02*	1.22±0.03
AST (U/L)	43.08±0.30	45±0.35**	45.9±0.66	42.58±0.38
ALT(U/L)	31.36±0.44	35.45±0.43**	36.5±0.35**	30.6±0.24

* P<0.05= Significant at 5% level as compared to zero minute value
**P<0.01= Significant at 1% level as compared to zero minute value

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