Haemato-biochemical studies on triflupromazine HCL and diazepam premedication for propofol anaesthesia in dogs

L. Suresha[1], B.N. Ranganath, M.S.Vasanth[1], L.Ranganath

Department of Veterinary Surgery & Radiology, Veterinary College,
Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore - 24, Karnataka, India
1. Department of Veterinary Surgery & Radiology, Veterinary College,
Karnataka Veterinary, Animal and Fisheries Sciences University, Hassan-573 201, Karnataka, India
Corresponding author: L. Suresha, email: drsuresh227@gmail.com
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Abstract

Aim: To study the effect of Triflupromazine Hcl and diazepam in combination with propofol as preanaesthetic on haemato-biochemical parameters in dogs was carried out.

Materials and Methods: 16 clinical cases of dogs undergoing different surgical interventions irrespective of age, sex and breed were allotted randomly in to two groups viz., Group A (Triflupromazine Hcl – propofol) and Group B (diazepam – propofol) consisting eight dogs each. Blood samples were collected at different intervals from both the Groups in heparinised syringes as follows: Prior to premedication, fifteen minutes after premedication, fifteen minutes, one hour, six hour, 24 hour and 48 hour after induction with Propofol. The samples were subjected for various hematological and biochemical analysis.

Results**:** Hematology revealed a significant (P 0.05) fall in total erythrocyte count (TEC), packed cell volume (PCV) and haemoglobin (Hb), whereas TLC showed a non significant decrease in both the groups throughout the observation period of 48 hours. In the present study blood glucose level was significantly increased between 15 min to one hour in Group A and 15 min to 6 hours of observation period of the study in Group B. The total plasma protein (TPP), alanine amino transferase (ALT),alkaline phosphatase (AP) and creatinine levels did not differ significantly in both the groups throughout the observation period of 48 hours.

Conclusion: Both the anaesthetic combinations were found to be safe and effective with smooth and stress free recovery. However triflupromazine Hcl premedication proved to be better with quick sedative effect, long duration of anaesthesia with less induction dose of propofol and shorter recovery time than diazepam.

Key words: dogs, diazepam, haemato-biochemical, propofol, triflupromazine

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Introduction

Anaesthesia is an indispensable pre-requisite to most of the surgical interventions, both in humans and animals, so that the surgeon can perform surgical intervention with maximum precision and sagacity. Anesthetics are available for both parenteral as well as inhalation routes in canine surgery. Propofol is a unique non-barbiturate, non-steroid, short-acting general intravenous anaesthetic agent [1]. Propofol anesthesia in dogs is characterized by its rapid onset, short duration, rapid metabolism, and lack of accumulation on rapid administration, some degrees of respiratory depression, and a rapid smooth recovery from anesthesia. More advantageously, it is readily available in the market. Anaesthetic stage duration of propofol could be enhanced if used in combination with premedication like diazepam and triflupromazine [2].

Diazepam is a popular benzodiazepine derivative for use in different animal species. The drug has a dose dependant effect. The drug was reported to have minimum effect on respiratory system, heart rate and rectal temperature [3]. The drug was reported to cause good muscle relaxation and can be used to curb convulsions. However, studies on this combination are scanty. Hence, the present study was undertaken with an objective to evaluate the efficacy of Triflupromazine Hcl and diazepam in combination with propofol as preanaesthetic on haemato-biochemical parameters in dogs.

Materials and methods

Experimental animals: The study was carried out in

16 clinical cases of dogs undergoing different surgical procedures irrespective of age, sex and breed presented to the Department of veterinary Surgery and radiology, Veterinary college Hospital, Bangalore. These animals were randomly allocated in to two groups viz., A & B consisting eight dogs each. Solid food was withheld 12 hrs and water for at least 6 hrs, prior to surgery. The conduct of the experiment was approved by the Animal Ethics Committee of the College.

Administration of anesthesia: Atropine sulphate was injected IM @ 0.04 mg/kg BW to all the dogs irrespective of the group, 30 min prior to administration of sedatives. In group A, Triflupromazine hcl was given IV @ 1 mg/kg BW, whereas Diazepam was injected IV @ 1 mg/kg BW as sedative in group B. Fifteen minutes later Propofol (1%) was administered IV @ 5 mg/kg BW till the loss of pedal reflex in both the groups. Further, incremental doses of Propofol were given for maintenance of anesthesia till the completion of surgery. All the animals from both the groups were clinically evaluated. Site of operation was prepared aseptically and surgery was performed as per standard procedures.

Parameters assessed: Blood samples were collected at different intervals from both the Groups in heparinised syringes as follows: Prior to premedication, fifteen minutes after premedication, fifteen minutes, one hour, six hour, 24 hour and 48 hour after induction with Propofol.

Whole blood was used for haematological studies and blood glucose estimation. Plasma was separated and stored in deep freeze until further analysis. The samples were subjected for various hematological and biochemical analysis.. The samples were analyzed for total erythrocyte count (TEC millions/cu.mm), packed cell volume (PCV%), haemoglobin (Hb g/dl), differential leukocyte count (DLC%), as per standard procedure. The biochemical parameters Alanine amino transferase (ALT units/liter), alkaline phosphates (AP units/liter), plasma creatinine (mg/dl), Total plasma protein (TPP) and Blood glucose were estimated by Ames glucometer (Gx, USA).

Statistical Analysis: The mean and standard error for all the parameters were computed. The variations in the clinical and biochemical parameters before, during and after anaesthesia at different time intervals for both the treatments were analyzed by two way analysis of variance [4]. The comparison between means of groups within and between groups and periods among the treatments were compared by least square significance difference test (LSD test) using SPSS software.

Results and Discussion

The results of haematological and biochemical parameters recorded in group A and group B animals at different intervals are presented in Table-1.

Hematological Parameters: There was a statistically significant fall in total erythrocyte count (TEC), packed cell volume (PCV) and haemoglobin (Hb) in both the groups throughout the observation period of 48 hours, which could be attributed to spleenic pooling of blood constituents [5,6], shifting of fluids from extra vascular compartment to intravascular compartment to maintain normal cardiac output and also could be due to loss of blood during surgery [7].

The result of the present study was in agreement with [8, 9] who observed a similar trend. However no significant difference was observed in the hematological parameters during administration of propofol anaeathesia [10]. Similarly, a significant decrease in PCV and non-significant drop in TEC and haemoglobin during Propofol anaesthesia in dogs was observed [11]. Both the combinations had a similar decreasing effect on the hematological parameters in the present study.

A non significant decrease in total leukocyte count (TLC) was observed in both the groups throughout the observation period of the experiment. However, the decrease in TLC could be attributed to spleenic pooling of blood constituents at maximal depth of anaesthesia [2,6] and also could be due to loss of blood during surgery [7]. The results of the present study were in accordance with the findings of several workers [12,13,14].

In Group A, differential leukocyte count (DLC) did not change significantly during different periods of experiment, except a significant fall in lymphocyte count was observed between 15 minutes to 48 hours of observation period, which was in agreement with the findings of Sharma et al. [15]. In Group B, there was no statistically significant variation in DLC during different periods of observation except for neutrophils, which was significantly increased between 1 to 48 hours and significant fall in lymphocyte count between 6 to 48 hours of observation period. Similar findings were reported by David [10] that neutrophilia with corresponding lymphopenia during Propofol anaesthesia in dogs, whereas, Kim et al, [12] reported no significant change in DLC level during Xylazine - Propofol anaesthesia in dogs.

In the present study blood glucose level was significantly increased between 15 min to one hour in

Table-1. Comparative results of haemato-biochemical parameters recorded in group A and group B animals at different intervals (mean ± SE)

Parameter	Time interval					
	Before induction		After induction			
	0 minute	15 minute	0 hour	6 hour	24 hour	48 hour
TEC(10^6/cmm)						
Group A	6.60±0.23^{ax}	5.60±0.09^{bx}	5.42±0.17^{bcx}	5.05±0.14^{bcx}	5.43±0.17^{bcx}	5.48±0.14^{bcx}
Group B	7.75±0.19^{ay}	6.93±0.36^{by}	6.35±0.15^{cy}	6.05±0.09^{cy}	6.43±0.20^{bcy}	6.57±0.15^{bcy}
PCV (%)						
Group A	44.72±1.86^{ax}	39.72±1.47^{bx}	36.30±1.16^{bcx}	35.72±0.93^{cx}	35.01±0.99^{cx}	36.83±1.03^{bcx}
Group B	42.55±1.93^{ax}	40.65±1.35^{abx}	38.45±1.81^{bcx}	36.98±1.19^{cx}	36.55±1.29^{cx}	37.48±0.98^{cx}
Hb (g/dl)						
Group A	14.30±0.76^{ax}	12.20±0.22^{bx}	12.77±0.16^{bx}	12.07±0.19^{bx}	12.26±0.22^{bcx}	13.06±0.54^{cx}
Group B	13.46±0.32^{ax}	12.60±0.22^{abx}	12.00±0.18^{bdx}	11.50±0.38^{cdx}	12.20±0.22^{bdx}	12.42±0.21^{bdx}
TLC (10^3cmm)						
Group A	12.95±1.22^{ax}	10.02±0.94^{ax}	10.12±0.93^{ax}	10.25±0.86^{ax}	10.47±1.07^{ax}	11.07±1.41^{ax}
Group B	12.41±1.13^{ax}	9.57±0.92^{ax}	9.78±0.95^{ax}	10.42±1.09^{ax}	9.76±0.95^{ax}	10.57±1.20^{ax}
DLC %						
Neutrophils						
Group A	70.25±0.86^{ax}	69.25±1.54^{ax}	70.00±1.06^{ax}	70.50±0.70^{ax}	71.12±1.44^{ax}	71.87±1.41^{ax}
Group B	69.12±1.43^{ax}	68.00±0.73^{ax}	69.50±0.35^{abx}	70.00±0.90^{abx}	68.75±0.49^{ax}	72.50±0.98^{bx}
Leukocytes						
Group A	30.37±0.76^{ax}	28.75±1.26^{acx}	25.50±0.42^{bx}	26.75±0.31^{bcx}	25.12±0.95^{bx}	24.75±0.35^{bx}
Group B	26.87±0.35^{ay}	26.00±0.46^{abx}	26.75±0.45^{ax}	25.00±0.88^{acx}	24.12±0.35^{bdx}	23.75±0.41^{cy}
Eosinophils						
Group A	1.75±0.36^{ax}	1.50±0.70^{ax}	1.00±0.37^{ax}	0.87±0.29^{ax}	1.25±0.31^{ax}	1.37±0.32^{ax}
Group B	0.50±0.18^{ay}	0.87±0.44^{ax}	1.50±0.42^{ax}	0.75±0.25^{ax}	1.00±0.37^{ax}	1.12±0.35^{ax}
Monocytes						
Group A	1.37±0.26^{ax}	0.87±0.22^{ax}	1.12±0.29^{ax}	1.62±0.32^{ax}	1.00±0.26^{ax}	1.25±0.25^{ax}
Group B	0.62±0.32^{ax}	1.12±0.29^{ax}	0.50±0.26^{ax}	1.00±0.26^{ax}	0.86±0.22^{ax}	1.12±0.29^{ax}
Basophils						
Group A	0.25±0.16^{ax}	0.37±0.36^{ax}	0.25±0.16^{ax}	0.12±0.12^{ax}	0.37±0.18^{ax}	0.25±0.16^{ax}
Group B	0.62±0.26^{ax}	0.25±0.16^{ax}	0.12±0.12^{ax}	0.25±0.25^{ax}	0.56±0.18^{ax}	0.25±0.16^{ax}
TPP(g/dl)						
Group A	6.78±0.26^{ax}	6.07±0.28^{ax}	6.64±0.13^{ax}	6.91±0.34^{ax}	7.00±0.31^{ax}	6.70±0.13^{ax}
Group B	6.239±0.55^{ax}	5.56±0.21^{ax}	6.36±0.12^{ax}	6.87±0.14^{ax}	6.40±0.17^{ax}	6.45±0.15^{ax}
Blood glucose (mg/dl)						
Group A	96.25±4.44^{ax}	108.62±2.42^{bx}	120.12±1.09^{cx}	110.37±2.01^{bdx}	107.37±1.84^{bdx}	102±3.95^{abx}
Group B	88.00±1.60^{ay}	100.25±2.98^{bey}	108.12±2.71^{cfy}	115.00±1.63^{cdx}	106.25±2.00^{efx}	94.37±2.52^{agx}
ALT (SGPT) (U/Lit.)						
Group A	28.62±0.65^{ax}	20.87±0.58^{ax}	28.50±0.56^{ax}	28.75±0.61^{ax}	29.25±0.55^{ax}	29.00±0.62^{ax}
Group B	25.12±0.39^{ax}	25.50±0.32^{ax}	25.75±0.41^{ax}	26.12±0.58^{ax}	25.00±0.50^{ax}	25.62±0.32^{ax}
AP(U/lit)						
Group A	75.00±1.55^{ax}	75.50±1.80^{ax}	76.75±2.17^{ax}	77.00±2.24^{ax}	75.25±1.68^{ax}	75.50±1.84^{ax}
Group B	70.37±1.45^{ay}	71.25±0.86^{ax}	71.75±1.37^{ay}	72.24±1.58^{ay}	71.62±1.38^{ax}	71.00±1.47^{ax}
Creatine (mg/dl)						
Group A	0.73±0.05^{ax}	0.86±0.05^{ax}	0.75±0.04^{ax}	0.88±0.05^{ax}	0.81±0.03^{ax}	0.75±0.01^{ax}
Group B	0.69±0.03^{ax}	0.82±0.06^{ax}	0.71±0.03^{ax}	0.85±0.06^{ax}	0.74±0.01^{ax}	0.78±0.02^{ax}

Means bearing any one common superscript either in rows (a,b,c,d,e,f) or in column (x,y) didn't differ significantly($P \leq 0.05$).

Group A and 15 min to 6 hours of observation period of the study in Group B. The raise in glucose level might be due to the anaesthetic agents, which seems to exert their effect on subcortical pathway, which is responsible for regulation of Adrenocorticotropic hormone (ACTH) and produces stress like condition with increased release of glucocarticoides [16].

The total plasma protein (TPP), alanine amino transferase (ALT), alkalinehosphatase (AP) and creatinine levels did not differ significantly in both the groups throughout the observation period of 48 hours [17].

Comparing the haematological parameters, a significant fall in values of total erythrocyte count, packed cell volume, haemoglobin were observed in both the groups. No significant changes were observed in Total leukocyte count of both the Groups. No changes

in differential leukocyte count in both the groups except for lymphopenia in Group A and neutrophilia with corresponding lymphopenia in Group B was observed.

In biochemical parameters, a significant increase in blood glucose level was observed in both the groups, where as the values of total plasma protein, alanine amino transferase, alkaline phosphatase and creatinine did not show any variation in both the groups during the observation period of the study .

Conclusion

The haemato-biochemical changes induced by both Triflupromazine and diazepam with propofol were of transient in nature. This indicates both Triflupromazine-Propofol and Diazepam-Propofol combinations would not alter the liver and kidney functions. Thus both the combinations have proved to be safe and effective general anesthetics with smooth and stress free recovery. Triflupromazine-Propofol produced quick sedative effect, long duration of anesthesia with less induction and maintenance dose of anesthesia with short recovery time and hence was found to be a better combination for general anesthesia compared to that of Diazepam-Propofol for clinical surgeries of short duration in dogs.

Author's contribution

LS carried out research work, BNR was adviser during the research. MSV designed the experiment. LR analyzed the data, prepared and revised the manuscript. All authors read and approved the final manuscript.

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Competing interests

Authors declare that they have no competing interest.

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