The Pharma Innovation Journal 2023; SP-12(7): 564-568

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(7): 564-568

www.thepharmajournal.com
Received: 19-05-2023
Accepted: 30-06-2023

Rahul Paul
Veterinary Surgery & Radiology, College of Veterinary Sciences & A.H. Central Agricultural University Aizawl, Mizoram, India

Basanta Saikia
Veterinary Surgery & Radiology, College of Veterinary Sciences & A.H. Central Agricultural University Aizawl, Mizoram, India

Analisha Debbarma
Veterinary Surgery & Radiology, College of Veterinary Sciences & A.H. Central Agricultural University Aizawl, Mizoram, India

Corresponding Author:
Rahul Paul
Veterinary Surgery & Radiology, College of Veterinary Sciences & A.H. Central Agricultural University Aizawl, Mizoram, India

Effects on the Haemato-biochemical parameters by propofol, Ketofol and Etomidate as induction agent in Glycopyrrolate premedicated dogs maintained under Isoflurane anaesthesia

Rahul Paul, Basanta Saikia and Analisha Debbarma

Abstract
The present study was undertaken in 18 dogs with elective surgery (castration, spaying etc.) to evaluate the effect of propofol, Ketofol and etomidate as induction agents on Haemato-biochemical parameters in glycopyrrolate premedicated dogs maintained with isoflurane. The animals were randomly divided into three groups *viz*. group P, KP & E, comprising six animals in each group. All the animals of the three groups were premedicated with glycopyrrolate @ 0.01 mg/kg IM, 10 minutes prior induction. Propofol @ 6mg/kg IV, Ketofol @ 4mg/kg and etomidate @ 3mg/kg was administered as induction agent in group P, KP and E respectively. Maintenance of anaesthesia was carried out by using isoflurane in all the animals in all three groups. Parameters of Haemato-biochemical profile were studied at (baseline) 0 min and thereafter 5-, 15-, 30-, and 60-minutes time interval after induction.

Keywords: Glycopyrrolate, Propofol, Ketofol, etomidate, isoflurane, Heamato-biochemical parameters

Introduction
Propofol (2, 6-diisopropyl phenol) is an injectable anaesthetic agent belonging to the alkyl phenol group, with characteristics of very rapid redistribution from the brain to other tissues and can also efficiently eliminated from plasma through hydroxylation by one or more hepatic cytochrome P- 450 isoforms, results in a rapid onset of action, short duration of action with a complete and excitement-free rapid recovery, with good muscle relaxation, but with poor analgesic properties (Zoran *et al.*, 1993, and Hall *et al.*, 2001) [20, 5]. Ketofol administration offered effective sedation for spinal anaesthesia for gynaecologic, ophthalmologic and cardiovascular procedures in all age groups. The main advantage of this drug combination over alone propofol administration is the opposing hemodynamic and respiratory effects of each drug that enhance safety and efficacy and decrease the dose of propofol required for induction (Daabiss *et al.*, 2009) [3]. Association of ketamine and propofol may reduce unwanted adverse effects of both drugs, since these drugs act on different extremes – excitation and depression, respectively (Mair *et al.*, 2009) [10]. Etomidate is a carboxylate imidazole derivative nonbarbiturate, short-acting, IV anaesthetic. Etomidate is characterized by better hemodynamic stability, minimal respiratory depression, and cerebral protective effects (Robert and Hiller, 2006) [15]. Etomidate induced minimal changes in cardiopulmonary function in hypovolaemic dogs (Pascoe *et al.*, 1992) [13]. This study was undertaken to evaluate effects of propofol, ketofol and etomidate on haemato-biochemical parameters as induction agent in glycopyrrolate premedicated dogs maintained under isoflurane anaesthesia.

Materials and Methods
The study was conducted on clinical cases of dogs of either sex those were brought to the Teaching veterinary Clinical Complex (TVCC), College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Aizawl, Mizoram. The animals were randomly divided into three groups *viz*. group P, KP & E, comprising six animals in each group. All the animals of the three groups were premedicated with glycopyrrolate @ 0.01 mg/kg IM, 10 minutes prior induction. Propofol @ 6mg/kg IV, Ketofol @ 4mg/kg and etomidate @ 3mg/kg was administered as induction agent in group P, KP and E respectively. Maintenance of anaesthesia was carried out by using isoflurane in all the animals in all three groups.

Haemato-biochemical parameters (Hb, PCV, TEC, TLC, Monocyte count, lymphocyte count, granulocyte count, serum glucose, ALT, AST, GGT, BUN, serum creatinine) were studied at (baseline) 0 min and thereafter 5, 15, 30, and 60 minutes after induction. Statistical analysis was carried out by SPSS version 20.

Results and discussion

Haemato-biochemical parameters

Haematological parameters

The mean ± SD values of haematological parameters, i.e., haemoglobin (g/dL), PCV (%), TEC (M/mm3), TLC (thousand/mm^3), monocytes count (%), lymphocytes count (%), and granulocytes count (%) of different groups in different time intervals were observed and depicted in the Table 1. In this study non-significant decrease in Hb and PCV value was observed in group P, KP and E after administration of induction agents respectively and towards the end of the study gradual increase was observed in the Hb and PCV value towards the baseline in all three groups. Significant variations in Hb levels were observed between the groups but all the values within group and among groups did not exceed normal physiological limits. The mean values of PCV were recorded with non-significant variations at all (0, 5, 15, 30, 60 min) time intervals among all the groups. Similar findings for Hb and PCV were also observed by Bayan *et al.* (2002) [2], Sharma *et al.* (2017) [16] and Shinde *et al.* (2018) [18] with propofol anaesthesia and significant decrease in Hb and PCV levels followed by gradual increase towards the end of study in propofol anaesthesia in dogs was observed by Thejasree *et al.* (2018) [19]. Non-significant decrease in Hb and PCV were observed by Sharma *et al.* (2017) [16] and Shinde *et al.* (2018) [18] and significant decrease followed by increase in Hb levels were observed by Thejasree *et al.* (2018) [19] in ketofol anaesthesia. Non-significant decrease in Hb but significant decrease in PCV value from baseline to end of trail was observed by Perk *et al.* (2002) [14] in etomidate/alfentanil anaesthesia in dogs. The decrease in Hb and PCV values might be due to the splenic pooling of circulating erythrocytes that occur with most of the anaesthetics or due to haemodilution in response to fluid therapy during anaesthetic protocol or due to inter compartmental fluid shift in order to maintain normal cardiac output Kumar *et al.* (2014) [9] and Thejasree *et al.* (2018) [19]. Non-significant decrease ($p \geq 0.05$) in TEC in group P initially followed by slight increase was observed towards the end of trial and similar findings with propofol anaesthesia were observed by Bayan *et al.* (2002) [2], Sharma *et al.* (2017) [16] and Shinde *et al.* (2018) [17]. Highly significant ($p \leq 0.01$) decrease in TEC values were recorded in group KP at different time intervals. The mean value of TEC showed significance difference ($p \leq 0.01$) among the groups but were within physiological range. However, in a study by Shinde 2018 [17] *et al.* non-significant decrease in TEC was observed in ketofol anaesthesia till the end of study in dogs where values were remained within normal physiological limits. In group E initially non-significant decrease in TEC followed by gradual increase towards the baseline at the end of study was observed but significant decrease in TEC value from baseline to the end of anaesthesia was observed by Perk *et al.* (2002) [14] in etomidate/alfentanil anaesthesia in dogs. Significant difference of TEC was recorded between the three experimental groups at different time intervals till the end of the observation. Non-significant decrease ($p \geq 0.05$) in TLC values in all three groups were observed initially followed by slight increase in TLC at the end of anaesthetic trial. Similar pattern in TLC values was observed by Bayan *et al.* (2002) [2] with propofol whereas Sharma *et al.* (2017) [16] reported non-significant changes in TLC values with both propofol and Ketofol anaesthesia. Non-significant decrease in TLC value from baseline to the end of anaesthesia was observed by Perk *et al.* (2002) [14] in etomidate/alfentanil anaesthesia in dogs. No significant difference of TLC was noted within the three experimental groups at different time intervals till the end of the observation. The decrease in both TEC and TLC values in this study might be due to individual variation in animals, or due to use of different anaesthesia agents in different groups or Splenic sequestration during anaesthesia might be the cause of decrease in TEC levels or combine effects of all. There was non-significant difference observed in monocyte count at different time intervals within all three groups but significant difference ($p \leq 0.01$) observed between group E compared group P and KP in the trail. No significant variations were recorded within the groups and between the groups. Sharma *et al.* (2017) [16] observed significant increase in monocyte in Ketofol group at the end of study compared to baseline whereas in propofol group non-significant decrease in monocyte count was observed at the end of study compared to baseline in group P non-significant decrease in monocyte was observed throughout the study period. Similar decreased in monocytes count in propofol anaesthesia was also observed by Nusory (2011) [12]. In group E non-significant decrease in monocyte was observed from 15 min to the end of observation. The non- significant decrease in monocyte count might be due to splenic vasodilation due to anaesthetic drugs or might be due to administration of intravenous fluid administration throughout the anaesthetic protocol or might be combine both. Significant variation of monocyte count between groups might be due to higher baseline values of monocyte in group E or might be due to use of different anaesthetic drugs in different groups or both. There was no non-significant difference ($p \geq 0.05$) in lymphocyte count was observed throughout the anaesthetic protocol among the groups and between the groups and all values are within normal physiological range although gradual decrease in lymphocyte value was observed in all three groups. Similar findings of decreased in lymphocytes count in propofol anaesthesia was observed by Kelawala *et al.* (1996) [8] and Surbhi (2008) [18] whereas Sharma *et al.* (2017) [16] observed non-significant decrease in lymphocyte in both propofol and ketofol group initially but at the later stage non-significant increase in lymphocyte count. In group E, at 5 min non-significant increase in lymphocyte count followed by gradual decrease till the end of study period was observed. The non-significant decrease in lymphocyte count might be due to splenic vasodilation due to anaesthetic drugs or might be due to administration of intravenous fluid administration throughout the anaesthetic protocol or might be combine both. Non-significant increase ($p \geq 0.05$) in granulocyte count was observed throughout the anaesthetic protocol in both group P and KP whereas in group E initially non-significant decrease ($p \geq 0.05$) in granulocyte count observed followed by gradual increase in lymphocyte count was observed till the end of anaesthesia. All the variations remain within normal physiological range. The mean values of granulocyte count were recorded with slight non-significant variations throughout the trail among all three groups. Similar findings of increased in neutrophil count in propofol anaesthesia was recorded by Kelawala *et al.* (1996) [8] and Surbhi (2008) [18]

whereas, Sharma *et al.* (2017) [16] observed non-significant increase in neutrophil in propofol group initially but gradual decrease towards the baseline and goes down below the baseline level. In a relatively similar study by Sharma *et al.* (2017) [16] non-significant increase in neutrophil count was observed in Ketofol anaesthesia and remained higher than the baseline value at the end of anaesthesia. In group E initially non-significant decrease in granulocyte at the initial stage followed by gradual increase in granulocyte was observed. No significant variations were recorded within the groups and between the groups. Increase in overall granulocytes might be due to increase in neutrophil count. The non- significant increase in granulocytes count might be due to splenic vasodilation due to anaesthetic drugs or might be due to administration of intravenous fluid administration throughout the anaesthetic protocol or Surgical and anaesthetic stress leading to stimulation of the adrenal cortex or might be combination of all factors.

2. Biochemical parameter

The mean ± SD values of bio chemical parameters, i.e., serum glucose (mg/dL), ALT (U/L), AST (U/L), GGT (U/L), BUN (mg/dL), and serum creatinine (mg/dl) of different groups in different time intervals were observed and depicted in the Table 2. In all the group glucose value significantly ($p \leq 0.05$) & ($p \leq 0.01$) increased till the end of observation but changes remain within normal physiological range. Among the groups significantly increase glucose value was recorded in group P and group KP at 30- and 60-min time interval as compared to group E. Similar increase in blood glucose was observed by Bayan (2002) [2] with propofol and Anandmay *et al.* (2016) [1] with buprenorphine- propofol and alone propofol anaesthesia at 1 hrs. post induction in canine. In group KP significant increase in glucose value was observed in 30- and 60-min time interval and similar significant increase in blood glucose in Ketofol induced dogs was recorded by Njoku (2015) [11]. However non-significant increase in blood glucose value with propofol at 60 min and Ketofol at 60 min was observed by Sharma *et al.* (2018). In group E significance difference was observed at the end period of the study and Similar significant findings was observed by Perk *et al.* (2002) [14] with etomidate/alfentanil anaesthesia in dogs. Sumer *et al.* (2012) and Kaushal *et al.* (2015) [7] observed increase in glucose values in the patients treated with etomidate. The increase was observed in the present study might be due to cortisol and catecholamine mediated gluconeogenesis along with decrease peripheral use of glucose reported by Bayan *et al.* (2002) [2]. There was no significant difference ($p \geq 0.05$) in ALT and AST values were observed throughout the anaesthetic trials among the groups and between the groups but non-significant increase in ALT values was observed in all three groups throughout the study period but the values remained within normal physiological range. In group P non-significant increase in ALT and AST was observed throughout the study period and similar findings of non-significant increase in ALT and AST were observed by Thejasree *et al.* (2018) [19] and Shinde *et al.* (2018) [17] in propofol anaesthesia. In group KP non-significant increase in ALT and AST were observed throughout the study period, similar to the findings of Thejasree *et al.* (2018) [19]. However, non-significant decrease in ALT and AST were observe in ketofol group in dogs by Shinde *et al.* (2018) [17] which was contrary to the present findings. Non-significant increase in ALT and AST were observed up to 60 min compared to the baseline and non-significant increase in ALT and AST was observed by Hareesh *et al.* (2018) [6] in etomidate anesthesia, which was similar to the present finding. Perk *et al.* (2002) [14] observed non-significant decrease in ALT and non-significant increase in AST in etomidate/alfentanil anaesthesia in dogs. Highly significant difference ($p \leq 0.01$) in GGT values were recorded in group P and group KP at different time interval except 0 min in compared to group E. GGT values were significantly increased up to 30 min. compared to baseline followed by decreased end of the experiment. These findings are similar to the findings of Ward *et al.* (2006) in captive wild dogs and Nusory (2011) [12] during propofol anaesthesia in dogs and Anandmay *et al.* (2016) [1] observed non-significant increase in GGT values at 1 hour interval was recorded compared to baseline in propofol anaesthesia in dogs. Significant difference in GGT values within the groups were recorded throughout the experiment except at the baseline. GGT is more sensitive than ALT and AST for detecting liver damage. The transient variations in ALT, AST and GGT values in the present study were within normal physiological limits might be indicative of non-toxic/less harmful effect of all the anaesthetic drugs on hepatobiliary system. In group P, KP and E non-significant ($p \geq 0.05$) increase in BUN values were observed till 30 min. but towards the end part of observation it declined towards the baseline. There were highly significant ($p \leq 0.01$) variations in the mean values of BUN were recorded among the groups at different time interval but remain normal physiological range. Non-significant increase in BUN values were observed in group P and KP up to 30 min followed by decrease in BUN value towards the baseline towards the end of the study. Similar findings were observed by Sharma *et al.* (2017) [16] and Shinde *et al.* (2018) [17] with propofol. However, Shinde *et al.* (2018) [17] observed decrease in BUN values after recovery compared to baseline in dogs in ketofol anaesthesia. In group E, non-significant increase followed by decrease in BUN values were observed in the study period but all were remained within normal physiological limit. Perk *et al.* (2002) [14] observed decrease in BUN values with etomidate/alfentanil anaesthesia in dogs. BUN values recorded at baseline and all other time intervals showed significant variations between all three groups but were within the normal range. In both group P and KP highly significant ($p \leq 0.01$) increase in creatinine value was observed throughout the study period compared to baseline (0 min) but values remained within normal physiological range. In this study significant increase in the creatinine values were observed in group P up to 30 min and decreases towards the baseline at the end part of study and relatively similar findings were observed by Sharma *et al.* (2017) [16] and Shinde *et al.* (2018) [17] observed non-significant increase in creatinine during maintenance followed by decrease after recovery from anaesthesia. In group KP increase in the creatinine values were observed up to at the end of anaesthesia and similar findings were observed by Sharma *et al.* (2017) [16] where increase in creatinine was observed at the end of anaesthesia in Ketofol group compared to baseline. In group-E, creatinine values were non significantly increased than its base value during anaesthetic trial at different time intervals. It fluctuated within normal physiological limits. Its might be due to etomidate does not affect the renal blood flow and glomerular filtration rate recorded by Grimm *et al.* (2015) [4]. The variations in BUN and creatinine in all groups in different time intervals might be due to use of different induction agents in different groups and random selection of animals in

groups or might be both. Increase in BUN and creatinine value during trail period in all groups might be due to the temporary inhibitory effects of anaesthetic drugs on the renal blood flow leading to decrease in glomerular filtration.

Table 1: Mean ± SD values of different haematological parameters at different time intervals in group P, KP and E Values in the same row with different superscripts (small front) differ significantly and Values in the same column with different superscripts (capital front) differ significantly

Parameters	Groups	Baseline (0 min)	5 min	15 min	30 min	60 min	Significance
HB	P	14.17 ± 0.99^{Ba}	13.11 ± 1.05^{Ba}	12.72 ± 1.08^{Ba}	12.97 ± 1.03^{Ba}	13.37 ± 0.87^{Ba}	NS
	KP	14.91 ± 1.4^{Ba}	14.29 ± 1.46^{Ba}	13.68 ± 1.49^{Ba}	13.30 ± 1.44^{Ba}	13.73 ± 1.48^{Ba}	NS
	E	12.24 ± 1.03^{Aa}	11.56 ± 1.21^{Aa}	11.16 ± 1.08^{Aa}	11.46 ± 0.91^{Aa}	11.78 ± 0.95^{Aa}	NS
	Significance	**	**	**	*	*	
PCV	P	49.18 ± 5.49Aa	46.92 ± 5.50Aa	46.60 ± 5.61Aa	47.19 ± 5.71Aa	47.94 ± 5.57Aa	NS
	KP	45.97 ± 3.24Aa	44.48 ± 3.53Aa	43.95 ± 3.26Aa	43.40 ± 3.51Aa	44.00 ± 3.41Aa	NS
	E	45.21 ± 2.39Aa	42.96 ± 1.77Aa	42.88 ± 2.42Aa	43.91 ± 2.72Aa	44.68 ± 2.80Aa	NS
	Significance	NS	NS	NS	NS	NS	
TEC	P	7.19 ± 0.48^{Ba}	6.67 ± 0.60^{Ba}	6.52 ± 0.64^{Ba}	6.68 ± 0.69^{Ba}	6.90 ± 0.68^{Ba}	NS
	KP	7.23 ± 0.39^{Bb}	6.76 ± 0.34^{Ba}	6.33 ± 0.56^{Ba}	6.25 ± 0.48^{Ba}	6.53 ± 0.48^{Ba}	*
	E	6.01 ± 0.84^{Aa}	5.29 ± 0.61^{Aa}	5.27 ± 0.45^{Aa}	5.39 ± 0.50 ^{Aa}	5.65 ± 0.49^{Aa}	NS
	Significance	**	**	**	**	**	
TLC	P	12.65 ± 1.36Aa	11.19 ± 1.05Aa	10.66 ± 1.19Aa	11.07 ± 1.47Aa	11.68 ± 1.43Aa	NS
	KP	12.63 ± 1.70Aa	12.06 ± 1.71Aa	11.68 ± 1.78Aa	11.33 ± 1.72Aa	11.72 ± 1.73Aa	NS
	E	15.05 ± 2.2Aa	13.47 ± 2.39Aa	13.45 ± 2.06Aa	13.60 ± 2.50Aa	13.90 ± 2.38Aa	NS
	Significance	NS	NS	NS	NS	NS	
Monocyte count	P	4.28 ± 0.77^{Aa}	4.08 ± 0.75^{ABa}	3.91 ± 0.82^{ABa}	3.73 ± 0.80^{Aa}	3.66 ± 0.78^{Aa}	NS
	KP	3.78 ± 0.60^{Aa}	3.50 ± 0.49^{Aa}	3.25 ± 0.40^{Aa}	3.11 ± 0.37^{Aa}	3.05 ± 0.39^{Aa}	NS
	E	4.78 ± 0.74^{Aa}	4.78 ± 0.61^{Ba}	4.65 ± 0.53^{Ba}	4.60 ± 0.39^{Ba}	4.55 ± 0.52^{Ba}	NS
	Significance	NS	**	**	**	**	
Lymphocyte count	P	18.11 ± 2.67Aa	17.51 ± 2.45Aa	17.13 ± 2.54Aa	16.91 ± 2.34Aa	16.58 ± 2.38Aa	NS
	KP	17.70 ± 1.94Aa	17.04 ± 1.84Aa	16.52 ± 1.71Aa	16.10 ± 1.67Aa	15.66 ± 1.64Aa	NS
	E	18.53 ± 2.35Aa	18.81 ±2.62Aa	18.63 ± 2.38Aa	17.98± 1.95Aa	17.68 ± 1.89Aa	NS
	Significance	NS	NS	NS	NS	NS	
Granulocyte count	P	77.60 ± 2.75Aa	78.43 ± 2.59Aa	78.95 ±2.74Aa	79.40 ± 2.53Aa	79.75 ± 2.67Aa	NS
	KP	78.51 ± 2.16Aa	79.45 ± 1.97Aa	80.22 ± 1.78Aa	80.78 ± 1.74Aa	81.28 ± 1.63Aa	NS
	E	76.68 ± 2.77Aa	76.40 ± 2.76Aa	76.71± 2.41Aa	77.41± 2.18Aa	79.56 ± 2.22Aa	NS
	Significance	NS	NS	NS	NS	NS	

Table 2: Mean ± SD values of different biochemical parameters at different time intervals in group P, KP and E Values in the same row with different superscripts (small front) differ significantly and Values in the same column with different superscripts (capital front) differ significantly

Parameters	Groups	Baseline (0 min)	5 min	15 min	30 min	60 min	Significance
Serum Glucose	P	89.51 ± 11.23^{Aa}	95.37 ± 11.27^{Aa}	98.90 ± 10.82^{Aab}	103.32 ± 10.50^{Bab}	110.15 ± 9.89^{Bb}	*
	KP	92.71 ± 9.28^{Aa}	97.38 ± 8.44^{Aab}	102.18 ± 7.46^{Aab}	107.16 ± 7.38^{Bb}	117.86 ± 7.47^{Bc}	**
	E	84.7 ± 6.29^{Aa}	87.50 ± 5.68^{Aab}	90.03 ± 5.60^{Aab}	92.58 ± 4.90^{Aab}	98.30 ± 4.34^{Ab}	*
	Significance	NS	NS	NS	*	**	
ALT	P	29.80 ± 2.63Aa	30.41 ± 2.76Aa	31.38 ± 2.92Aa	31.93 ±.33Aa	32.44 ±3.16Aa	NS
	KP	29.84 ± 1.05Aa	30.43 ± 1.12Aa	31.15 ± 1.2Aa	31..80 ± 1.15Aa	32.20 ± 1.15Aa	NS
	E	29.71 ± 2.42Aa	29.98 ± 2.49Aa	30.50 ± 2.43Aa	30.71 ± 2.66Aa	31.2 ± 3.00Aa	NS
	Significance	NS	NS	NS	NS	NS	
AST	P	16.72 ± 1.66Aa	16.97 ± 1.66Aa	17.25 ± 1.60Aa	17.29± 1.67Aa	17.6 ± 1.70Aa	NS
	KP	16.50 ± 1.62Aa	16.87 ± 1.57Aa	17.23 ± 1.52Aa	17.35 ± 1.57Aa	17.68 ± 1.55Aa	NS
	E	16.56 ± 1.61Aa	16.87 ± 1.42Aa	17.20 ± 1.32Aa	17.36 ± 1.58Aa	17.60 ± 1.56Aa	NS
	Significance	NS	NS	NS	NS	NS	
GGT	P	2.87 ± 0.41Aa	3.07 ± 0.37Ba	3.19 ± 0.34Bab	3.62 ± 0.39Bb	3.29 ± 0.36Bab	*
	KP	2.90 ± 0.23Aa	3.14 ± 0.18Ba	3.44 ± 0.23Bb	3.73 ± 0.20Bc	3.53 ± 0.27Bbc	**
	E	2.50b ± 0.30Aa	2.53 ± 0.22Aa	2.57 ± 0.26Aa	2.60 ± 0.23Aa	2.75 ± 0.27Aa	NS
	Significance	NS	**	**	**	**	
BUN	P	10.01 ± 0.96Ba	10.38 ± 1.10Ba	10.65 ± 1.02Ba	11.25 ± 1.02Ba	10.82 ± 1.06Ba	NS
	KP	11.36 ± 0.48Ca	11.68 ± 0.49Ca	12.13 ± 0.47Ca	12.06 ± 0.59Ba	11.98 ± 0.44Ca	NS
	E	8.00 ± 0.94Aa	8.03 ± 1.00Aa	8.05 ± 0.87Aa	8.20 ± 0.93Aa	8.14± 0.89Aa	NS
	Significance	**	**	**	**	**	
Serum Creatinine	P	0.94 ± 0.07Ba	1.04 ± 0.08Bab	1.16 ± 0.12Bbc	1.26 ± 0.08Bc	1.10 ± 0.14Ab	**
	KP	1.03 ± 0.11Ba	1.11 ± 0.10Ba	1.25 ± 0.08Bb	1.30 ± 0.09Bbc	1.40 ± 0.14Bc	**
	E	0.79 ± 0.13Aa	0.84 ± 0.12Aa	0.87 ± 0.15Aa	0.90 ± 0.16Aa	0.94 ± 0.13Aa	NS
	Significance	**	**	**	**	**	

Conclusion

The haemoglobin (Hb), packed cell volume (PCV), total leukocyte count (TLC), differential leukocyte count (DLC), lymphocyte count and granulocyte count did not show any significant difference in all three groups. But total erythrocyte count (TEC) showed significant decrease in group KP but non-significant variations of TEC were observed in group P and E. The blood glucose showed significant increase in all three groups. ALT, AST, and BUN did not show any significant difference in three groups. In group P and KP significant increase in GGT and creatinine was observed where as non-significant changes in GGT and creatinine was observed in group E. Based on the analysis of Haemato-biochemical parameters it was found that etomidate have slight advantage over propofol and Ketofol as a better induction agent but overall evaluation based on clinical, anaesthetic, cardiopulmonary, and Haemato-biochemical parameters, it was found that all three induction agents are relatively safe in glycopyrrolate premedicated dogs maintained under isoflurane anaesthesia.

References

1. Anandmay AK, Dass LL, Sharma AK, Gupta MK. Haemato- biochemical changes following administration of propofol in combination with buprenorphine in Atropinized dogs. J Ani. Res. 2016;6(3):531-536.
2. Bayan H, Sarma KK, Chakravarty P. Biochemical and haematological changes during propofol anaesthesia in canines. Ind. J Vet. Surg. 2002;23(2):95-96.
3. Daabiss M, Elsherbiny M, Rashed A. Assessment of different concentration of Ketofol in procedural operation. BJMP. 2009;2(1):27-31.
4. Grimm KA, Lamont LA, Tranquilli WJ, Greene SA, Robertson SA. Veterinary Anaesthesia and analgesia. 5th ed. Wiley Blackwell. USA. 2015, p 3-4, 280-289, 824.
5. Hall LW, Clarke KW, Trim CM. Veterinary Anaesthesia 10th ed. W.B. Saunders, Harcourt Publisher Ltd. London. 2001, p. 123-125, 396-397.
6. Hareesh AU, Veena P, Dhanalakshmi N, Veerabrahmaiah K. Comparative evaluation of etomidate and propofol anaesthesia following atropine, diazepam and fentanyl premedication in geriatric dogs. Int. J Curr. Microbiol. App. Sci. 2018;7(11):3144-3150.
7. Kaushal RP, Vatal A, Pathak R. Effect of etomidate and propofol induction on hemodynamic and endocrine response in patients undergoing coronary artery bypass grafting/mitral valve and aortic valve replacement surgery on cardiopulmonary bypass. Ann. Cardiac. Anaesth. 2015;18(2):172-178.
8. Kelawala NH, Kumar A, Chaudhary S, Singh HP. Effect of epidural xyl;azine with diazepam medication in dogs. I. Vet. J. 1996;73:552-557.
9. Kumar A, Kumar A, Tyagi SP, Sharma SK, Sharma R. Ketofol as a general anaesthetic agent in diazepam or midazolam premedicated and halothane anaesthetized dogs. Indian. J Vet. Surg. 2014;35(1):31-34.
10. Mair AR, Pawson P, Courcier E, Flaherty D. A comparison of the effects of two different doses of ketamine used for co-induction of anaesthesia with a target controlled infusion of propofol in dogs. Vet. Anaesth. Analg. 2009;36(6):532-538.
11. Njoku NU. Effects of maintenance of propofol-ketamine anaesthesia with repeat bolus and constant rate infusion of propofol on physiological, biochemical, anesthetic and analgesic indices in dogs. J Adv. Vet. Anim. Res. 2015;2(4):427-434.
12. Nusory D. Propofol and ketamine as a general anaesthetic in dog. M.V.Sc. Thesis, Assam Agricultural University, Guwahati-22, 2011.
13. Pascoe PJ, Ilkiw JE, Haskins SC. Cardiopulmonary effects of etomidate in hypovolemic dogs. Am. J Vet. Res. 1992;53(11):2178-2182.
14. Perk C, Guzel O, Gulanber EG. Etomidate/alfentanil anaesthesia in dogs and its effects on pulse oximeter, electrocardiography and haematological parameters. Turk. J Vet. Anim. Sci. 2002;26:1021-1024.
15. Robert S, Hiller SC. Pharmacology and physiology in anaesthetic practice, 4th ed. Lippincott Williams and Wilkins publishers, Philadelphia. 2006, p. 159-160.
16. Sharma D, Aithal HP, Amarpal, Kinjvadekar P, Shah MA, Rashmi, *et al*. Analgesic and haematobiochemical effects of dexmedetomidine ketofol- isoflurane anaesthesia in canine orthopaedic patients. Indian. J Vet. Surg. 2017;38(2):100-103.
17. Shinde PR, Chepte SD, Thorat MG, Raulkar RV, Ali SS, Fani FA, *et al*. Clinical efficacy of ketofol and propofol in dog. Int. J. Sci. Environ Technol. 2018;7(6):1949-1953.
18. Surbhi. Clinical studies on anaesthetic and analgesic management on canine orthopaedic patients. M.V.Sc. Thesis Deemed University, IVRI, Izatnagar (UP), India, 2008.
19. Thejasree P, Veena P, Dhanalakshmi N, Veerabrahmaiah K. Evaluation of propofol and Ketofol anaesthesia following atropine, diazepam and fentanyl premedication in dogs. Int. J Curr. Microbial. App. Sci. 2018;7(11):3130-3137.
20. Zoran DL, Riedesel DH, Dyer DC. Pharmacokinetics of propofol in mixed-breed dogs and greyhounds. Am. J Vet. Res. 1993;54:755-760.