



Comparative Evaluation of Propofol and Ketofol on Cardio-Respiratory Parameters during Ovariohysterectomy in Pyometritic Bitches

Rajvinder Grover* and Narinder Singh

Department of Veterinary Gynaecology and obstetrics
Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab India

ABSTRACT

Canine pyometra is a hormonally regulated condition affecting multiple systems during the diestrus phase, with potential grave consequences if untreated. Ovariohysterectomy stands as the optimal therapeutic intervention for pyometra, offering both cure and prophylaxis against future occurrences. The present study was conducted to compare the efficacy of induction as well as cardio-respiratory effects of two induction agents- Propofol and Ketofol in patients having pyometra. A total of twelve animals diagnosed with pyometra were divided into two equal groups (n=6). Both the group subjects were administered the pre-anaesthetic drugs (butorphanol @ 0.2 mg/kg b. wt, acepromazine @ 0.05 mg/kg b. wt. and atropine @ 0.02 mg/kg b. wt.) followed by propofol @ 4 mg per kg body weight in the propofol induction group (I), and ketofol @ 4 mg per kg body weight in the ketofol induction group (II), 15 minutes after injecting the pre-anaesthetics. During operative period, the patients were maintained by using Isoflurane. The cardiorespiratory parameters were recorded at - before-pre-anaesthetic, after pre-anaesthetic, and at post-induction intervals of 0, 15, 30, 45, 60, 75, and 90 minutes using Multi para monitor. Haemato-biochemical parameters were recorded at pre-operative, 30 min post-induction and post-operative interval. The results revealed that the induction time as well as the mean-recovery time was significantly faster in ketofol group as compared to propofol group. Similarly lower mean concentration of isoflurane was required to maintain surgical anaesthesia in ketofol group than propofol group. The heart rate and respiration rate were comparatively lower in propofol group and maintained on higher side in ketofol group. Similarly, systolic arterial pressure (SAP), diastolic arterial pressure (DAP) and mean arterial pressure (MAP) were comparatively lower but within physiological range in the propofol subgroups and remained on higher side but within physiological range in the ketofol subgroups. No significant alteration in haematological (Hb, PCV, TLC and DLC) and biochemical (AST, ALT, TP, BUN and Creatinine) parameters was recorded following administration of both type of induction agents affected with pyometra. The study concluded that induction as well as recovery was faster in ketofol group along with maintenance of anaesthesia. Hence, on the basis of a better cardiorespiratory and hemodynamic stability, ketofol should be preferred over propofol in undertaking OHX surgeries in healthy as well as pyometra affected bitches.

Keywords: Bitch, Ketofol, Ovariohysterectomy, Propofol, Pyometra.

INTRODUCTION

Canine pyometra is a uterine disorder of significant clinical importance, frequently encountered in veterinary emergency medicine. It is defined as a hormone-mediated, bacterial infection of the uterus that leads to the accumulation of purulent material within the uterine lumen. The condition typically affects older, nulliparous bitches, although it can occur in dogs of any age once they have reached sexual maturity. Jitpean *et al* (2012) reported that pyometra affects approximately 19% of bitches which are intact by the age of 10 yrs of age. Elective surgical procedure

of ovariohysterectomy is also carried out to neuter female dogs and management of estrous cycle associated issues like mammary tumour, vaginal prolapse, pro-estrus bleeding, sero-sanguinous discharge and undesirable mating. The treatment of choice for pyometra is ovariohysterectomy, which is both curative as well as preventive for recurrence. It is performed under general anaesthesia. The risk of general anaesthesia can be mitigated by choosing appropriate agents along with calibration of the dosage to limit the fatalities associated with septic conditions encountered during clinical conditions such as

Table 1. Detail of anaesthetic drugs used in different groups.

Description	Group -I (n=6)	Group- II (n=6)
Pre-anaesthetic agents (Intramuscularly)	Butorphanol (@ 0.2 mg/kg b. wt.), Acepromazine (@ 0.05 mg/kg b. wt.) Atropine (@ 0.02 mg/kg b. wt.)	Same as group 1
Induction agent (Intravenously)	Propofol @ 4mg/kg b. wt.	Ketofol (propofol @ 2 mg/kg b. wt. + ketamine @ 2 mg/kg b. wt.)
Maintenance agent (Endotracheal intubation)	Isoflurane	Isoflurane

pyometra (Bille *et al*, 2012). General anaesthesia is further achieved by combination of pre-anaesthetic, induction and maintenance agents. The protocol followed by using anaesthetic agents must work towards achieving short onset, adequate analgesia, healthy cardiorespiratory function as well as smooth recovery (Aouad *et al*, 2008).

Induction of anaesthesia is a highly critical process in which an animal transitions from a conscious to an unconscious state. No single anaesthetic agent provides all the desirable elements of general anaesthesia, and each agent adversely influences the function of one or more vital organs. Adverse complications linked to anaesthetic agents can be reduced by using two or more drugs in combination; this strategy is termed balanced anaesthesia. The central aim of this approach is to benefit from the required properties of selected drugs while limiting their capacity to cause unwanted depression of homeostatic mechanisms (Riviere *et al*, 2009).

Propofol is a frequently utilized induction agent in canines known for its rapid onset, brief duration, smooth induction and recovery processes, facile titration, swift clearance, and absence of accumulation owing to its lipid-soluble nature (Tsai *et al*, 2007). Its rapid onset, coupled with seamless induction and recovery, establishes it as a primary and customary induction agent. Nonetheless, propofol administration leads to dosage-dependent respiratory and cardiac depression, which is exacerbated by concurrent usage of sedatives like benzodiazepines, opioids, and centrally acting alpha 2 agonists. While premedication diminishes the required propofol dose, it does not entirely avert the onset of adverse cardiopulmonary effects.

Ketamine is another extensively employed anaesthetic in veterinary medicine. Notably, ketamine, at anaesthetic doses, does not depress the respiratory

and cardiovascular systems and boosts remarkable analgesic properties. Ketamine triggers the cardiorespiratory system, resulting in heightened cardiac activity, arterial blood pressure, heart rate, and central venous pressures. Typically, ketamine is not administered in isolation due to its association with suboptimal muscle relaxation, tachycardia, catalepsy, and muscle rigidity.

The amalgamation of ketamine and propofol in a 1:1 ratio, known as ketofol, offers several advantages, including a reduced incidence of propofol-induced respiratory depression, provision of analgesia, and mitigation of cardiorespiratory side effects (Mair *et al*, 2009). This combination also lowers the induction doses of both anaesthetic agents, thereby enhancing safety and efficacy and diminishing the adverse effects associated with each drug (Shinde *et al*, 2018; Grubb *et al*, 2020). Limited research exists on how propofol alone or combined with ketamine affects cardiovascular and respiratory functions in dogs with conditions like pyometra. Therefore, the present study was undertaken to compare the impact of propofol and ketofol on cardiorespiratory parameters as it can provide crucial insights for their safe utilization in canine surgical interventions.

MATERIALS AND METHODS

The present study was carried out on 12 female dogs presented for ovariohysterectomy due to pyometra in Teaching Veterinary Clinical Complex, GADVASU, Ludhiana. Twelve dogs presented were divided into two groups containing six animals each, based on the induction agent used (table 1). After 15 minutes of injecting pre-anaesthetic agents (Butorphanol @ 0.2 mg/kg b. wt., Butodol-2®, Neon laboratories limited; Acepromazine @ 0.05 mg/kg b. wt., VetOne® Acepromazine and Atropine @ 0.02 mg/kg b. wt., (Ek-tek®, Ek-tek pharma) intramuscularly, Propofol ((Neorof®, Neon laboratories limited)@4mg/kg b.wt. was administered

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Table 2. Mean $\pm$ SE values of induction time (seconds) and recovery time (min) following administration of propofol and ketofol as induction agent during ovariohysterectomy.

Group	Induction Time (seconds)	Recovery Time (minutes)
Propofol	34.50 $\pm$ 2.27	15.67 $\pm$ 1.90 ^A
Ketofol	43.67 $\pm$ 3.99	9.73 $\pm$ 0.98 ^B

Value marked with superscript A, B differ significantly within the column at 5 % level of significance.

Table 3. Mean $\pm$ SE values of isoflurane concentration (%) required to maintain surgical anesthesia at different time intervals in propofol and ketofol group during ovariohysterectomy.

Group	Time intervals						
	0 min	15 min	30 min	45 min	60 min	75 min	90 min
Propofol	2.10 $\pm$ 0.17	2.33 $\pm$ 0.10	2.67 $\pm$ 0.10	2.42 $\pm$ 0.14	2.08 $\pm$ 0.14	1.75 $\pm$ 0.10	1.50 $\pm$ 0.12
Ketofol	1.33 $\pm$ 0.15	1.67 $\pm$ 0.10	1.75 $\pm$ 0.10	2.08 $\pm$ 0.14	2.00 $\pm$ 0.17	1.58 $\pm$ 0.08	0.92 $\pm$ 0.14

Value marked with superscript A,B differ significantly at 5% level of significance in their respective induction agent subgroups.

slow intravenously (till effect) as induction agent in group-I whereas Ketofol [Ketamine(Aneket®, Neon laboratories limited) (@2mg/kg b.wt. + Propofol @ 2mg/kg b.wt)] was administered slow intravenously in group-II. All necessary pre-requisites such as fasting, pre-operative assessment of hemato-biochemical parameters, proper preparation of the surgical site and installation of multiparameter monitor were achieved in all cases Following induction, isoflurane with 100% isoflurane was used as maintenance agent till completion of surgical procedure.

Blood samples (5 ml) from each animal were collected from cephalic vein in a disposable syringe, distributed as 2ml in EDTA tube for hematological analysis which consisted of Haemoglobin (Hb), Packed Cell Volume (PCV), Total Leucocyte Count (TLC) and Differential Leucocyte Count (DLC) while 3ml blood was transferred into clot activator vial for biochemical analysis viz. Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Total Protein (TP), Blood Urea Nitrogen (BUN) and Creatinine using appropriate kits and auto analysers. The haematological and biochemical parameters were evaluated at following time intervals; (i) pre-operative-before pre-anaesthetics given; (ii) 30 minutes after induction of anaesthesia and (iii) post-operative- on completion of surgery.

Parameters assessed to evaluate the quality of anaesthesia were- Induction time (seconds), recovery time (minutes), Isoflurane concentration (%). Clinical evaluation was carried out by continuous monitoring of heart rate (beats per minute), respiration rate (breaths per minute), blood pressure (systolic, diastolic and mean arterial blood pressure), haemoglobin

oxygen saturation (SpO₂, %) and end tidal carbon dioxide (EtCO₂, %) and rectal temperature by using multi para monitor (model no. G30E, Philips Goldway (Shenzhen) Industrial Inc. Nanshan District, Shenzhen, P.R.China). The statistical analysis was done with the help of GraphPad Prism 8.0.2 software.

RESULTS AND DISCUSSION

A total of 12 dogs suffering from pyometra were subjected to surgical procedure of ovariohysterectomy using two different induction agents- group I- propofol and group-II Ketofol. The mean age of the pyometra affected cases was 6.50 $\pm$ 0.79 yrs and ranged from 1.5-12 yrs. Cases injected with propofol had a mean age of 6.83 $\pm$ 1.04 yrs whereas mean age of 6.17 $\pm$ 1.19 yrs was observed in Ketofol injected group. The mean body weight in group I and group- II was deduced to be 26.00 $\pm$ 3.94 and 26.00 $\pm$ 3.94 respectively. However no significant difference was found in the above parameters.

The induction time was the time period between the administrations of induction agent till the complete loss of jaw tone for intubation of endotracheal tube. Smooth, fast and excitement free anaesthesia induction was recorded in both the groups (*i.e.* propofol and ketofol) (table 2). The induction time was comparatively faster in the propofol group than the ketofol group which could be due to rapid action of propofol than its combination with ketamine. Andreoni and Hughes (2009) suggested that the swift initiation of induction with propofol and ketofol could be attributed to propofol's significant lipid solubility and rapid penetration of the blood-brain barrier. Similar findings were reported by Saikia *et al* (2016) and

Table 4. Mean $\pm$ SE values of propofol vs ketofol for different parameters at different time interval during ovariohysterectomy in pyometritic bitches.

Parameters	Group	Time intervals								
		Before pre-anaesthetic	After pre-anaesthetics	0 min	15 min	30 min	45 min	60 min	75 min	90 min
Heart rate (beats/min)	Propofol	120.83 $\pm$ 6.17	126.33 $\pm$ 9.03	119.67 $\pm$ 7.23 ^A	116.00 $\pm$ 7.10	118.83 $\pm$ 5.78	117.83 $\pm$ 6.07	115.33 $\pm$ 8.13	113.17 $\pm$ 9.64	113.33 $\pm$ 8.17
	Ketofol	122.30 $\pm$ 5.58	130.33 $\pm$ 8.20	133.86 $\pm$ 6.52 ^B	125.7 $\pm$ 5.82 ^B	123.00 $\pm$ 7.82	124.00 $\pm$ 7.91	118.50 $\pm$ 8.59	115.50 $\pm$ 8.12	119.20 $\pm$ 7.86
Respiration rate (breaths/min)	Propofol	34.00 $\pm$ 7.13 ^a	22.50 $\pm$ 2.60 ^{ab}	12.50 $\pm$ 1.17 ^b	11.17 $\pm$ 1.40 ^b	12.33 $\pm$ 2.89 ^b	10.83 $\pm$ 1.57 ^b	11.50 $\pm$ 0.76 ^b	11.33 $\pm$ 1.05 ^b	13.50 $\pm$ 0.99 ^b
	Ketofol	30.83 $\pm$ 3.03 ^a	26.83 $\pm$ 3.52 ^{ab}	14.83 $\pm$ 0.72 ^b	12.67 $\pm$ 1.97 ^b	14.50 $\pm$ 2.85 ^b	13.17 $\pm$ 2.02 ^b	14.50 $\pm$ 1.85 ^b	13.50 $\pm$ 1.88 ^b	14.33 $\pm$ 1.73 ^b
Rectal temperature ($^{\circ}$ F)	Propofol	102.6 $\pm$ 0.36 ^a	101.7 $\pm$ 0.29 ^{ab}	100.9 $\pm$ 0.16 ^b	100.1 $\pm$ 0.21 ^{bc}	99.50 $\pm$ 0.14 ^c	98.70 $\pm$ 0.17 ^c	98.12 $\pm$ 0.22 ^d	97.53 $\pm$ 0.19 ^{de}	96.98 $\pm$ 0.19 ^e
	Ketofol	101.7 $\pm$ 0.47 ^a	101.8 $\pm$ 0.32 ^a	101.4 $\pm$ 0.30 ^{ab}	101.0 $\pm$ 0.34 ^{ab}	100.4 $\pm$ 0.35 ^{ab}	99.97 $\pm$ 0.36 ^b	99.53 $\pm$ 0.37 ^b	99.17 $\pm$ 0.38 ^b	99.00 $\pm$ 0.40 ^b

Value marked with superscript A,B differ significantly within columns at 5 % level of significance.

Value marked with superscript a,b,c,d,e differ significantly within same rows at 5 % level of significance

Bayan and Konwar (2014) indicating that induction was quick and smooth with Propofol.

The mean recovery time was recorded from stop of isoflurane to the first coughing reflex. The recovery was fast and smooth without any complication like crying, drowsiness and pain with both the induction agents. the recovery time in bitches operated due to pyometra was significantly shorter with ketofol than propofol (Table 2). When ketamine and propofol are combined, propofol has a prolonged elimination half-life, whereas ketamine has a shorter half-life due to its quick biotransformation into norketamine. However, when propofol is provided at low doses, the drug had extended elimination half-life and low clearance in cats (Zonca *et al*, 2012). Kapil (2014) reported that in dogs pre anaesthetized with butorphanol and diazepam mean recovery time was 14.6 $\pm$ 1.90 min and 15.1 $\pm$ 1.39 min with propofol and ketofol respectively. Bodh (2011) reported that consciousness returned within 15 to 20 minutes following withdrawal of inhalant anaesthetics regardless of the induction drugs used in various animals.

The isoflurane concentration (%) required to maintain surgical anaesthesia was recorded at 0 min, 15, 30, 45, 60, 75 and 90-minute interval after induction (Table 3). The mean isoflurane concentration required at different time intervals have been presented in Table 5. The results of present study showed that the overall mean concentration of

isoflurane required to maintain surgical anaesthesia in the ketofol group significantly lower (1.6%, $P < 0.05$). than propofol group (2.5 %), respectively). This might be due to the fact that the rapid biotransformation of propofol into an inert metabolite through hepatic cytochrome P-450 isoforms, particularly via hydroxylation, contributes to its swift redistribution from the central nervous system to peripheral tissues. Solano *et al* (2006) documented a reduction in the isoflurane concentration necessary for sustaining general anesthesia in dogs when ketamine was introduced, mirroring findings in the current investigation. Hence, the diminished isoflurane levels observed in the ketofol subgroups were likely attributable to the inclusion of ketamine in the study.

Clinical evaluation comprised of recording heart rate, respiration rate, SpO₂, EtCO₂, systolic arterial pressure, diastolic arterial pressure and mean arterial pressure during pre-determined intervals.

Mean heart rate was recorded at mentioned intervals in anaesthetized patients. Heart rate differs significantly at 0 min, 15min and 30 min time intervals following administration of propofol and ketofol in pyometra affected bitches (Table 4). The heart rate was elevated from baseline after administration of preanaesthetic in both the groups. This could be due to the action of atropine which was used as pre-anaesthetic along with butorphanol and acepromazine under the study. The results showed that the heart rate remained more stable, steady and maintained on the

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Table 5. Mean $\pm$ SE values of propofol vs ketofol for different parameters at different time interval during ovariohysterectomy in pyometritic bitches.

Parameters	Groups	Time intervals						
		0 min	15 min	30 min	45 min	60 min	75 min	90 min
SAP (mm Hg)	Propofol	101.20 $\pm$ 6.67	97.83 $\pm$ 7.26	99.50 $\pm$ 8.75	102.67 $\pm$ 6.66	101.17 $\pm$ 2.40	102.83 $\pm$ 5.51	106.67 $\pm$ 3.79
	Ketofol	104.80 $\pm$ 6.55	114.67 $\pm$ 5.28	108.20 $\pm$ 7.13	110.30 $\pm$ 6.01	111.50 $\pm$ 4.91	114.00 $\pm$ 4.48	119.80 $\pm$ 6.49
SAP (mm Hg)	Propofol	55.00 $\pm$ 2.96	52.67 $\pm$ 5.29	51.67 $\pm$ 7.85	48.00 $\pm$ 6.52	45.83 $\pm$ 2.42	51.83 $\pm$ 3.09	52.67 $\pm$ 3.99
	Ketofol	52.33 $\pm$ 2.84	60.50 $\pm$ 4.03	59.50 $\pm$ 1.67	55.50 $\pm$ 3.85	57.00 $\pm$ 2.97	59.83 $\pm$ 2.36	61.50 $\pm$ 2.41
MAP (mm Hg)	Propofol	68.50 $\pm$ 4.91	61.83 $\pm$ 3.26 ^A	64.17 $\pm$ 6.96	65.00 $\pm$ 5.10	62.17 $\pm$ 2.88 ^A	68.00 $\pm$ 3.54	66.33 $\pm$ 1.82 ^A
	Ketofol	69.83 $\pm$ 3.36	77.50 $\pm$ 2.91 ^B	73.00 $\pm$ 3.03	75.00 $\pm$ 2.75	77.17 $\pm$ 2.10 ^B	76.67 $\pm$ 3.08	80.50 $\pm$ 3.79 ^B

Value marked with superscript A,B differ significantly within columns at 5 % level of significance.

higher side within normal physiological range (i.e. 90-140 beats/min) in the ketofol group. Whereas, when propofol was administered, slight drop in the heart rate was observed following induction (0 min) in group-I, but heart rate remained within the normal physiological range at later intervals.

It has been opined by Mair *et al* (2009) that use of ketamine-propofol combination has some advantages such as reduced incidence of propofol induced cardiorespiratory depression over using ketamine or propofol alone. In 2002, Bayan *et al* (2002) reported initial increase in heart rate followed by a steady drop in propofol anaesthetized dogs. Kapil (2014) compared butorphanol-diazepam-ketofol and butorphanol-diazepam- ketamine groups and butorphanol-diazepam-propofol and found that ketofol lead to an increase in heart rate after induction. Similar findings to the present study on heart rate had been reported following administration of propofol and ketofol by various authors (Bayan and Konwar, 2014; Lee *et al*, 2017; Shinde *et al*, 2018).

Respiration rate was similarly recorded at fixed intervals. Post induction decrease in respiration rate was observed in all the groups under the study. Decrease in respiration rate was marked with propofol, whereas, the decrease was comparatively small in the ketofol subgroups than the propofol subgroups. No significant difference was noted in the group-I and group-II however ketofol maintained respiration on a comparatively higher side when compared to propofol. The decrease in respiration rate recorded following administration of induction agent may be due to propofol which have respiratory depressant action. Similar effect of ketofol on respiration to the present study had been reported by Andolfatto and Willman (2010) and Bhavne *et al* (2019). On the contrary to the present study Martinez-Taboada *et al* (2014) also compared ketofol and propofol and observed higher

decrease in respiration rate in ketofol group as compare to propofol group.

Rectal temperature recorded during the study period showed significant decrease in the temperature throughout the operative procedure. However no significant difference was found on comparison of the groups divided. Muir and Hubbell (1989) documented that the induction of hypothermia following the application of sedatives and anesthetics is a consequence of reduced basal metabolic rate, decelerated muscle function, and diminished peripheral blood flow coupled with vasodilation resulting from the depressive impact on the thermoregulatory center. The decline in rectal temperature noted during the anesthesia phase could be attributed to the hypothermia induced by the sedative anesthetics. Kapil (2014) and Bhavne *et al* (2019) also reported concurrent findings.

Systolic arterial pressure (SAP), diastolic arterial pressure (DAP) and mean arterial pressure (MAP) were recorded during the study at fixed intervals (Table 5).

Non-significant rise in SAP was noted after ketofol administration. Systolic arterial pressure was maintained at higher level in ketofol group as compared to the propofol group. Although, the level of systolic arterial pressure remained in normal physiological range (90-160 mm Hg) with both the induction agent used. Similar findings to the present study following propofol and ketofol administration had been reported by Kapil (2014) and Saikia *et al* (2016). Mean DAP values were comparatively higher within ketofol group as compared to propofol group following administration of respective induction agent. Mean MAP was significantly lower at 15 min, 60 min and 90 min time interval in the propofol group than the ketofol group. This could be due to the fact that

Table 6. Mean $\pm$ SE values of SpO₂ (%) and end tidal carbon dioxide (mm Hg) at different time intervals in propofol and ketofol groups during ovariohysterectomy in pyometritic bitches.

Parameter	Group	Time interval						
		0 min	15 min	30 min	45 min	60 min	75 min	90 min
SpO ₂ (%)	Propofol	97.17 $\pm$ 1.07	97.17 $\pm$ 1.13	97.50 $\pm$ 0.88	96.83 $\pm$ 1.16	97.67 $\pm$ 0.91	97.67 $\pm$ 1.38	97.83 $\pm$ 0.87
	Ketofol	96.67 $\pm$ 0.95	97.17 $\pm$ 1.13	96.83 $\pm$ 1.19	96.17 $\pm$ 1.51	97.67 $\pm$ 0.76	98.17 $\pm$ 1.22	98.50 $\pm$ 0.92
EtCO ₂ (mm Hg)	Propofol	39.33 $\pm$ 2.33	39.50 $\pm$ 2.34	43.00 $\pm$ 2.84	43.17 $\pm$ 2.62	39.67 $\pm$ 2.78	39.00 $\pm$ 2.01	39.33 $\pm$ 2.21
	Ketofol	39.50 $\pm$ 2.60	39.00 $\pm$ 2.73	39.83 $\pm$ 2.85	38.33 $\pm$ 2.30	38.67 $\pm$ 2.53	40.00 $\pm$ 1.50	39.33 $\pm$ 1.22

No significant difference within the rows and within the columns at 5 % level of significance.

propofol causes a transient decrease in systolic, diastolic and mean arterial blood pressure due to myocardial depression peripheral vasodilation, decreased sympathetic outflow. Whereas, significant increase in diastolic pressure was observed following administration of ketofol as induction agent (Sharma *et al*, 2014; Saikia *et al*, 2019) which could be due to positive and synergistic effect of propofol and ketamine when combined together (Schuszler *et al*, 2010). The similar results following propofol and ketofol administration had been reported by Henao-Guerrero and Ricco (2014) and Paul *et al* (2019).

Oxygen saturation (SpO₂) did not exhibit any significant difference in the mean SpO₂ at different time interval between propofol vs ketofol groups (table 6). In both groups, the mean values remained within normal physiological range (95-100%) in all patients. Similar findings have been reported by Kapil (2014), Lee *et al* (2017) and Saikia *et al* (2019).

Similarly, the mean values of EtCO₂ observed at different time intervals did not reveal any significant difference in propofol and ketofol groups. The results of present study were in accordance with the previous report by Lee *et al*. (2017) claiming that at all time points, there was no significant difference in EtCO₂ values between the propofol alone, 3:7 ketofol and 1:1 ketofol groups.

Haematological evaluation comprised of haemoglobin and packed cell volume estimation at described intervals. In both the groups, decrease in the value of Hb and PCV was recorded at 30 min after induction and postoperative intervals, non-significantly. The decline in haemoglobin levels observed in this research could stem from factors such as blood loss, haemodilution (resulting from fluid administration for blood pressure regulation), or potential splenic sequestration of erythrocytes, a phenomenon commonly associated with various anaesthetic agents. Similar findings have been

recorded by Sharma *et al*. (2017) who reported fall in Hb levels at 30-minute intervals using ketamine alone, 1% propofol alone and ketofol in ratios of 1:1 and 2:1, groups. Similarly, other workers, also found a considerable drop in Hb following continuous propofol infusion in dogs (Nusory, 2011; Bayan *et al*, 2002; Jena *et al*, 2014).

The mean values of TLC concentration at 30 min and post-operative time intervals as compared to pre-operative TLC concentration within the propofol and the ketofol groups, significant difference was observed. Sharma *et al*. (2017) did not find any variation in TLC count at different time intervals at 0 min before premedication and at 30 min and 60 min intervals during anaesthesia in orthopaedic patients.

In the present study, Differential leucocyte count (DLC) was also recorded at various intervals. Neutrophils showed a non-significant decrease at 30 min and postoperative time interval as compared to pre-operative values. Mean lymphocyte count showed an increase at the recorded intervals in both groups. However, this increase was deduced to be significantly elevated in the ketofol group only. Contrary to the present study Sharma *et al* (2017) observed that there was significant decrease at 30 minutes following induction of anaesthesia with ketofol, whereas, there was no significant drop when propofol used. The eosinophil cell count did not reveal any significant changes in both groups in present study.

Biochemical estimation of the patients included in the study was undertaken by evaluation of Aspartate amino transferase (AST), Alanine amino transferase (ALT), Total protein (TP), Blood urea nitrogen (BUN) and Creatinine at specified intervals. The mean AST values showed decreasing trend in ketofol group however the propofol group showed non-significant ($P < 0.05$) increase at 30 min and post operative duration. 0.05). The findings of current study were in agreement with Kapil (2014) and Shinde *et al*

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(2018) observed non-significant increase in AST values at 0 min 45 min and recovery intervals as in propofol group, whereas, in ketofol group, AST values showed decreasing trend within intervals (0 min, 45 min and recovery). Variations in the ALT concentrations were observed at different time intervals within each group under the study however, the difference was non-significant. Results of the present study showed minor variation in the concentration of total protein at different time intervals within propofol vs ketofol group. Blood urea nitrogen and urea estimation if the dogs included in the study revealed non significant alterations during the observation period. Similar findings have been deduced by Kapil (2014), Sharma *et al* (2017) and Shinde *et al.* (2018).

CONCLUSION

Pyometra, a hormone-induced condition, involves endometrial changes from bacterial infection. Surgical management, an ovariohysterectomy, must be performed cautiously due to fragile uterine tissues and adequate anaesthetic protocol must be adopted for smooth induction and faster recovery. In the present study, propofol and ketofol were compared as induction agents in two groups (6 each) of bitches suffering from pyometra. Both the groups exhibited faster induction and recovery. Comparatively, Ketofol group required lesser isoflurane during the maintenance of anaesthesia. Higher heart and respiration rates were recorded along with more haemodynamic stability in the ketofol induced group. No significant difference was observed in haemato-biochemical parameters in bitches subjected to propofol or ketofol during ovariohysterectomy.

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