A STUDY ON THE EVALUATION OF COMBINATION OF XYLAZINE WITH GLYCOPYRROLATE AND DIAZEPAM FOR PRE-MEDICATION IN THIOPENTAL ANAESTHESIA IN DOGS

THESIS

BY

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(BVC/ M/VSR/001/2016-17)

Submitted to

BIHAR ANIMAL SCIENCES UNIVERSITY,

PATNA, BIHAR

In partial fulfillment of the requirements

FOR THE DEGREE OF

MASTER OF VETERINARY SCIENCE

IN

VETERINARY SURGERY & RADIOLOGY

2019

DEPARTMENT OF VETERINARY SURGERY AND RADIOLOGY
BIHAR ANIMAL SCIENCES UNIVERSITY,
PATNA, BIHAR

Title of thesis:	A study on the evaluation of a combination of xylazine with glycopyrrolate and diazepam for pre-medication in thiopental anaesthesia in dogs.
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Admission number	BVC/M/VSR/001/2016-17
Major discipline:	Veterinary Surgery and Radiology
Minor discipline:	Veterinary Medicine
Date of thesis submission:	14/08/2019
Total pages of thesis:	68
Major advisor:	Dr. Mithilesh Kumar

Abstract:

The study was conducted on 12 adult female dogs of different breeds, age and weight presented at Department of Veterinary Surgery and Radiology of Bihar Veterinary College, Patna for routine surgery which includes cases of ovary hysterectomy, pyometra or uterine infections. All the dogs were randomly divided in two groups each containing six animals. Animals of group I were pre-medicated by administration of glycopyrrolate @ 0.011 mg/kg bwt. i/m., followed by Diazepam @ 0.5mg/kg bwt i/v. In group II dogs were administered glycopyrrolate and xylazine @ 0.011mg/kg bwt i/m and 1.0mg/kg bwt i/m respectively and after 15 minutes diazepam was administered intravenously. In the both groups thiopental was administered @ 10 mg/kg bwt. i/v for induction & maintenance of general anaesthesia after 2 minutes of pre-medication. The evaluation of anaesthesia was made on the basis of clinical examination, Hematological evaluation, Biochemical evaluation and Physiological evaluation before and after pre anaesthesia, during anaesthesia and during recovery periods. The induction time of anaesthesia was rapid in group II dogs (1.89 ± 0.34 min.) than in the group I (2.78 ± 0.38 min.). The depth of anaesthesia was satisfactory in Group II, but was not satisfactory in Group I. The duration of anaesthesia was found prolonged in group II dogs (49.11 ± 6.67 min) than in the group I (39.52 ± 4.96 min). But the recovery time was found less in group II dogs (68.00±3.89 min) than in the group I (76.83 ± 5.26 min). The analgesia and sedation scores were found more in group II dogs than in the group I. The total dose (in ml) of thiopental for induction and maintenance was found less in group II dogs (4.51 ± 0.99) than in the group I (8.35 ± 1.23). **Conclusion:** Xylazine with glycopyrrolate and diazepam combination as preanaesthetic medication with thiopental anaesthesia produce adequate sedation, analgesia and smooth induction in dogs. Xylazine exhibits dose sparing effect on thiopental anaesthesia used for induction and maintenance of anaesthesia in dogs.

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1 INTRODUCTION

A variety of injectable anaesthetic drugs can be used to induce general anaesthesia and chemical restrain in animals. Proper use of pre-anaesthetic medication is imperative for anaesthetic drugs to produce the desired effect and to avoid detrimental side effects. No single anaesthetic drug produces all of the components of general anaesthesia without depressing some vital organ function so, a multiple drug approach (balanced anesthesia) is exploited to diminish sensory, motor sympathetic and para sympathetic reflex activities, and to attenuate individual components of the anaesthetic state (Tripathi, 1999). The development of balanced anaesthesia is the key for achieving safe and satisfactory anaesthesia in diverse nature of surgical ailments. Scientist developed varieties of anaesthetics for performing different surgical procedures in different species of animals, they differ uniformity in action, doses and some create complications or produce toxicity or sometimes will be costly. All the small animal surgical procedures are being conducted under general anaesthesia, which may result in complications like toxicity, late recovery, hypotension, respiratory depression and individual idiosyncracy. However, administration of premedication proved to reduce the dose but also the adverse effects of the general anaesthesia. Hence various agents like xylazine, glycopyrrolate, diazepam have been used as premedicants to minimize the complications of general anaesthetic used.

The injectable anaesthetics offer several advantages over inhalation anaesthetics like they produce easy and very rapid induction of anaesthesia, they do not require costly and specialized equipments for administration, they can be used safely in presence of diathermy or thermocautery as there is no chance of fire or explosion. They are useful for surgery on the respiratory tract

or about head, especially in patients in which intra cranial pressure may be elevated. They have lesser degree of myocardial depressant and hypotensive effects, compared with many inhalation anaesthetics.

Xylazine

Xylazine is classified as an analgesic as well as a sedative and skeletal muscle relaxant. It is a potent α-2-adrenergic agonist. It has potent sedative effect, but cardiopulmonary depression can be profounded **(**Paddeford & Harvey, 1999, Green &Thurman 1981). The chemoreceptor trigger zone is activated by xylazine to trigger emesis. Other side effect as hyperglycemia, platelet aggregation, GIT motility depression. Xylazine causes hypotension due to decrease in central sympathetic nervous activity (Lumb and Jones,1996). Hyperglycaemic effect of xylazine might be due to the result of alpha-2 adrenergic inhibition of insulin released from beta pancreatic cells and to an increased glucose production in the liver (Gasthuys *et al.*,1990).

Glycopyrrolate

It is synthetic quaternary ammonium anticholinergic drug. It is used to decrease salivary trachea bronchial and pharyngeal secretions and the volume & acidity of gastric secretions (Lumb and Jones,1996; Watney *et al.,*1987). It blocks vagal reflexes during induction of anesthesia & intubation. It doesn't cross placental barrier and blood brain barrier. It diminishes the volume and free acidity of gastric secretion and controls excessive pharyngeal, tracheal, and bronchial secretion (Watney *et al*, 1987). It antagonises muscarinic symptoms (e.g., bronchorrhea, bronchospasm, bradycardia, and intestinal hypermotility) induced by cholinergic drugs such as the anticholinesterases (Neto *et al*, 2004).

Diazepam

Diazepam drug acts on CNS and it is chloride channel openers (ion-channel). It is prototype of benzodiazepines that promote binding of γ-aminobutyric acid (GABA), the major central inhibitory neurotransmitter to GABA- receptors. It reduces muscle tone by supra spinal rather than spinal action and inhibits both mono & poly-synaptic reflexes (Hall L.W., 1971). It produces sedation, which limits the dose that can be used for reducing muscle tone.

Diazepam is used for control of seizures & skeletal muscle spasm & spasticity. It is particularly valuable in spinal injuries, status epileptics, tetanus & non-specific seizures.

Thiopental

Thiopental (thiopentone) is an ultra-short acting barbiturate (duration of action <0.5 hours). Bitter tasting, white to off-white crystalline powder or a yellow-white hygroscopic powder. It is sparingly soluble in water, but its sodium salt is soluble in water. It is administered intravenously as an aqueous solution of sodium which is alkaline and highly irritant.

Slow injection is recommended to minimize respiratory depression and the possibility of overdosage. Momentary apnea following each injection is typical, and progressive decrease in the amplitude of respiration appears with increasing dosage. Muscles usually relax after unconsciousness is attained, but this may be masked if a skeletal muscle relaxant is used. The tone of jaw muscles is a fairly reliable index. The pupils may dilate but later contract; sensitivity to light is not usually lost until a level of anesthesia deep enough to permit surgery is attained. Corneal and conjunctival reflexes disappear during surgical anesthesia. When Pentothal (Thiopental Sodium for Injection, USP) is used for induction in balanced anesthesia with a skeletal muscle relaxant ,brief periods of apnea may occur. When Pentothal (Thiopental Sodium for Injection, USP) is used as the sole anesthetic agent, the desired level of anesthesia can be maintained by injection of small repeated doses as needed or by using a continuous intravenous drip.

Respiratory depression (hypoventilation, apnea), which may result from either unusual responsiveness to Pentothal (thiopental sodium). Barbiturates are known to alter the normal physiochemical system especially the hepatic function in man and laboratory animals (Gary and Trenewsky, 1983). Among various barbiturates, an ultra-short acting barbiturate, thiopentone sodium is most commonly used in dogs.

Objectives:

1. To evaluate the sedative, analgesic and clinical effects of combination of glycopyrrolate, Xylazine and Diazepam pre- anaesthetics with thiopental.

2. To estimate the dose sparing effects of Xylazine on Diazepam and thiopental anaesthesia.

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2 REVIEW OF LITERATURE

Regarding the use of midazolam with glycopyrrolate-xylazine combination for premedication in ketamine anaesthesia in dogs, in presented literatures disclose less information, but Kawar *et al.* (1985) stated that midazolam 0.3 mg/kg and diazepam 0.5 mg/kg were used for induction of anaesthesia in two groups of 10 patients each suffering coronary artery bypass surgery. Haemodynamics variables were measured throughout induction of anaesthesia, later pancuronium and following tracheal intubation. The induction of anaesthesia with midazolam produced a slight but significant increase in heart rate. There was a significant fall in systemic arterial pressure and pulmonary artery pressure following both drugs. Although the fall in systemic arterial pressure, the cardic index was maintained in patients who received midazolam. The cardio-stimulatory effect of laryngoscopy and tracheal intubation was not prevented by either of the benzodiazepines or morphine. It was concluded that midazolam was suitable alternative to diazepam.

Waterman (1981) observed that the bradycardia not seen when the two drugs were given together. Muscle relaxation was good and recovery was smooth in all the case by evaluated that respiratory and pulse rates decreased after xylazine administration in calves.

Green *et al.* (1981) in a range of animals including dogs, cats, pigs, sheep, goats, non-human primates, rabbits, guineapigs, rats, mice and hamsters and observed Ketamine alone or supplemented by diazepam or xylazine as an anaesthetic. Ketamine alone had severe limitations in most species, but in combination proved to be valuable.

Samy *et al.* (1982) reported the level of BUN was markely elevated. The total serum protein, calcium and inorganic phosphorus showed slight changes. The blood parameters returned to their preanaesthetic values within 48 hours of anaesthetization by showed experiments with mixture of ketamine (3 mg/kg) and xylazine (0.3 mg/kg) on sheep. Anaesthetic effect was obtained in small doses.

The average anaesthetic period persevered for 75 minutes. Clinical studies revealed rise in respiratory rate as well as decreased level of erythrocytes, haemoglobin content, haematocrit and TLC. Lymphopenia, eosinopenia with subsequent rise in neutrophils were observed. The activities of the aspertate, alanine aminotransferase and alkaline phosphatase were improved.

Kumar *et al.* (1983) described that intramascular administration of Ketamine caused a significant increase in heart rate, blood pressure and respiration rate in goats. Atropine with xylazine and ketamine caused an insignificant decrease in rectal temperature and did not modify either the pattern or frequency of respiration in animals receiving ketamine. In their opinion pulse rate did not rises to the level induced by ketamine alone in goats when combination of atropine, xylazine and ketamine were used. That was probably due to the parasympathomimetics action of xylazine. Muscle relaxation was good and recovery was smooth in all the case.

Kawar *et al.* (1985) described that midazolam 0.3 mg / kg and diazepam 0. 5 mg / kg were used for induction of anaesthesia in two groups of 10 patients each undergoing coronary artery bypass surgery. Haemodynamic variables were measured during induction of anaesthesia, after pancuronium and succeeding tracheal intubation. The induction of anaesthesia with midazolam produced a slight but significant increase in heart rate. There was a significant fall in systemic arterial pressure and pulmonary artery pressure following both drugs. Despite the fall in systemic arterial pressure, the cardiac index was maintained in patients who received midazolam. The cardio-stimulatory effect of laryngoscopy and tracheal intubation was not prevented by either of the benzodiazepines and morphine in the dosage used. It was concluded that midazolam is appropriate alternative to diazepam.

Kumar *et al.* (1986) reported prosperous use of ketamine; an analogue of phencyclidine group, alone and in combination with other drugs in goats. They also observed a light salivation after administration of ketamine. Temperature and respiration rate remained unaffected but the heart rate was significantly increased up to 30 min. After administration of ketamine heart rate was declined to normal levels by 120 minutes.

Nolan *et al.* (1987) deliberate the antinociceptive activity of intravenously administered α-2 adrenoreceptors agonists, clonidine and xylazine in sheep using thermal and mechanical pressure threshold detection systems. Antinociceptive activity for both forms of thresholds stimuli exhibited by both the drugs. The antinociceptive effects were reversed by idazoxan (0.10 mg/kg i/v) but were not affected by naloxone at 0.2 mg/kg i/v indicating that these effects were mediated through α-2 adrenorecepters.

Watney *et al.* (1987) reported that in opinion of the drawbacks of tachycardia, glycopyrrolate was probably the anticholinergic agent of choice in comparision of atropine, hyoscine in dog.

Nightingale and Norma, (1988) studied the effects of midazolam @ 15 mg and temazepam 20 mg orally as premedicants in day case surgery patients. Midazolam produced a similar degree of anxiolysis to temazepam and a greater incidence of drowsiness. Recovery was still depressed four hours post-operatively. It was concluded that midazolam was a suitable drug for premedication in day case surgery.

Vigo *et al.* (1989) in pigs they observed good analgesia and rapid recovery with 1-2 mg/kg xylazine i/m as preanaesthetics, followed by 10-18 mg/kg ketamine i/m.

Moen and Fargetton (1990) in dogs, described that the period of the anaesthetic effects of 40 micrograms/kg medetomidine with 5 mg/kg ketamine was comparable to that provided by 1mg/kg xylazine and 15mg/kg ketamine combination but the period of muscle relaxation was significantly longer. The recovery from medetomidine/ketamine took longer than recovery from xylazine/ketamine but there were fewer side effects.

Gasthuys *et al.* (1990) in foals studied the cardiovascular changes induced by several sedative agents including promethazine. The cardiovascular depression was long lasting (> 90 min.) after administration of propionyl promazine (0. 08 mg / kg intravenous) and promethazine (0.08 mg kg. i.v.). The phenothiazine - induced sedation was not optimal, xylazine (0. 6 mg / kg, i.v.) and detomidine (20

fg / kg i.v.) induced initial but transient cardiovascular effects with an increase in systemic blood pressure a reduction in cardiac output of blood for 15 minutes.

Tranquilli *et al.* (1990) evaluated that the depressant effect of midazolam and xylazine on the central nervous system in 12 dogs. Xylazine was administered to 6 dogs (1.1 mg/kg,i/v) followed in 5 minutes by midazolam (1.0mg/kg,i/m). In a second group of dogs, xylazine (2.2mg/kg,i/m) was followed in 5 minutes by midazolam (1.0mg/kg,i/v). Both drug regimens induced rapid and profound sedation or anaesthesia.

O ' Brien *et al.* (1991) reported that patient who received rectal thiopental were more deeply sedated than those who received the drug combination by compared the effects of rectal thiopental 25 mg / kg with the combination of meperidine 2 mg / kg, promethazine 1 mg / kg and chlorpromazine 1 mg / kg for their sedative actions. The time course of sedation was different for the two treatment routines, at 15 and 30 minutes after administration.

Tranquilli *et al.* (1991) in dog, examined the thiamylal sparing effect of midazolam. Using a replicate latin square design, all dogs were given placebo (saline solution) and 0.025, 0.05, 0.1, 0.2 mg/kg midazolam prior to i/v administration of thiamylal sodium. The 0.1 and 0.2 mg/kg dosage significantly decreased the amount of thiamylal required to obtund swallowing reflex and easily achieved endotracheal intubation. Midazolam at 0.1 and 0.2 mg/kg reduced thiamylal requirement by 16.4% and 18.9%, respectively, whereas the 0.05 mg/kg dosage decreased thiamylal requirement by only 6.8%.

Ramaswamy *et al.* (1991) observed that ketamine when administered in dogs; produced rough emergence, lack of adequate muscle relaxation and excessive salivation. These side effects could be overcome by ketamine-xylazine combination or ketamine-promazine combination and they also reported that ketamine did not produce any cumulative or toxic effect in dogs.

Reddy *et al.* (1991) studied on 14 to 16 months old cross bred calves and observed the effects of xylazine administered in two doses by i/m routes. Slight decrease in respiratory rate, heart rate, PCV, RBCs and WBCs were noticed with both the dose regimens and pronounced sedative effect was reported at a dose

level of 0.3 mg/kg body weight, while optimum effect was evident when 0.2 mg/kg b. wt. was administered..

Pandey *et al.* (1991) observed that there was significant increase in total leucocyte count and neutrophils percentage, while lymphocytes dropped significantly and also reported that the diazepam (@ 3 mg/kg) and ketamine ((@ 10 mg/kg) had induced anaesthetics effect for an average duration of 37.00 ± 3.29 minutes. During anaesthesia experimental animals showed drop in pulse rate, respiration rate and body temperature by studied the effect of diazepam and ketamine on dog.

Ameerjan *et al.* (1992) used diazepam and evaluated that diazepam eliminated muscular hyper-tonicity, provided optimum anaesthesia with good degree of analgesia at lower dosage of ketamine and assured a quiet and dull recovery.

Malik *et al.* (1992) concluded that for H-reflex testing of canine patients, midazolam/ketamine or propofol were best for anaesthesia by studied the effect of sedative or anaesthetic regimens midazolam/ketamine, propofol, xylazine, fentanyl/droperidol, and halothane, on the caudal cutaneous sural nerve evoked H-reflex in dogs.

Vahala (1993) reported that the outset of ataxia was fast (1.5 ± 0.6 min) in the ketamine-xylazine mixture administered at doses of 5.07± 1.16 mg/kg ketamine and 2.11 ± 0.53 mg/kg xylazine, similarly like lying down (3.2 ± 1.0 min) and loosing sensation (6.3 ± 1.6 min) in comparision to ketamine-medetomidine in African wild dog .

Woods *et al.* (1994) validated the use of midazolam with pethidine in 32 premoulting female southern elephant seals. The animals were heavily sedated with midazolam 0.04 mg/kg combined with pethidine (4 mg/kg). This combination made it possible to give the seals i.v. injections and was rapidly antagonised by naloxone. After sedation with midazolam and pethidine, 2 to 3 mg/kg i.v. thiopentone or ketamine induced light immobilization for approximately 5 minutes and allowed the animals to be intubated. Persistent deep levels of restraint were achieved after sedation with midazolam and pethidine by repeated i.v. doses of

approximately 1.5 mg/kg ketamine at 10 minutes intervals, to maintain restraint for 60 minutes.

Softeland *et al.* (1995) concluded the induction of anaesthesia in pigs by thiopentone (27.1-35.7 mg/kg, mean 29.9 mg/kg) followed by bolus doses and continuous infusion of midazolam and fentanyl (0.90 mg/kg followed by 0.90 mg/kg/h and 0.025 mg/kg followed by 0.025 mg/kg/h, respectively). This produced good anaesthesia and analgsia for upto 2 hours in Norwegians Landrace pigs.

Singh *et al.* (1996) reported that horses given glycopyrrolate had significantly higher heart rate; mean, systolic, and diastolic arterial blood pressures; cardiac index, oxygen delivery and mixed venous oxygen tensions, with significantly less tissue oxygen extraction, compared to saline-treated horses. They reported that glycopyrrolate significantly reduced the cardiovascular dysfunction attributable to general anesthesia with xylazine and ketamine. The return of intestinal motility was delayed by 3 to 6 hours without causing any serious side effects.

Kumar *et al.* (1996) in goat they stated that α-2 agonist (Detomidine) could be used safely as preanaesthetic with ketamine. They observed that the duration of anaesthesia and muscle relaxation were greater in animals given atropine-detomidine-ketamine as compared to the animals given atropine-xylazine-ketamine combination.

Pandey *et al.* (1996) in horses they deliberate the utility and safety of xylazine-ketamine combination with and without diazepam. They reported that the induction of anaesthesia was smooth in animals of both the groups. The induction was 43± 3.32 seconds and 63.32±4.60 seconds in group I and II respectively. The period of anaesthesia was 9.46±1.62 minutes in group I and 25±1.62 minutes in group II.

Skarda and Muir (1996) demonstrated that xylazine administered epidurally @ 0.17 mg/kg or 0.25 mg/kg in mares produced dose dependent cardio pulmonary depression, with significant reduction in heart rate, respiration rate and arterial blood pressure and sedation mild to moderate.

Chitale *et al.* (1998) studied on the effect of the use of ketamine after premedication with alpha-2 agonist with diazepam. They divided goats in four groups. Premedicated with diazepam-xylazine in group A, diazepam-medetomidine in group B, diazepam-romifidine in group C and diazepam alone in Group D. He observed that heart rate and rectal temperature was maximum in the animal of group C.

Kinjavdekar (1998) perceived that epidural / Intrathecal administration of α-2 agonists caused dose reliant cardiopulmonary melancholy. In goat heart rate, respiration rate and arterial pressure were significantly decreased after epidural administration of xylazine.

Dyson and Davies, (1999) studied on dogs, they described on benefits of glycopyrrolate in the treatment of bradycardia.

Luna *et al.* (2000) studied in dogs, the cardiorespiratory and analgesic effects of romifidine or xylazine combined with ketamine and premedicated with 1.0 mg/kg of methotrimeprazine IV, followed by 0.1 mg/kg of romifidine (n = 8) or 1.0 mg/kg of xylazine (n = 8) and 15 mg/kg of ketamine IM, using a double blind randomised design. Both groups developed hypothermia, bradycardia, slight hypotension and reduction in respiratory rate and minute volume. There were negligible changes in end tidal CO_2 and O_2 saturation. There were no differences either in time or between the groups in pH, PaO_2, and blood biochemistry. In both groups reflexes to pain were reduced until 30-45 minutes of anaesthesia.

Bishnoi and Saini (2001) observed that midazolam alone @ 0.5 mg/kg body weight produced good sedation while, midazolam @0.4 mg/kg body weight when used in combination with thiopentone sodium “to effect” provided satisfactory surgical anaesthesia for almost 30 minutes by examined the effects of midazolam as a sedative agent alone and in combination with thiopental sodium.

Cheema and Singh (2001) in buffaloes, described the use of midazolam @ 0.2 mg/kg i.v. followed by thiopental sodium (5%) “to effect” after 5 minutes. They reported that the effective dose of thiopental was significantly reduced to 6 mg/kg. ECG changes were minimal in lateral recumbency but were significant in dorsal recumbency. Changes in heart rate and respiratory rate were significant.

Raj and Singh (2001) examined on calves of buffalo with xylazine hydrochloride 0.4 mg/kg i/m in group I followed by 10 minutes later by midazolam i/m @0.3 mg/kg in group II or by i/v route in group III and found that onset of sedation in group I, II and III was 15.50± 1.76, 18.56 + 1.560 and 17.75 ± 1.71 minutes respectively. The duration of peak effect was 17.00± 2.86, 27.75 ± 2.96 and 26.00 ±4.25 minutes with complete recovery time of 46.50 ± 6.24, 58.00 ± 2.48 and 55.00 ± 5.40 minutes, respectively. Cutaneous analgesia was upto 27.75 ± 3.57 and 20.50± 3.67 minutes in group II and III respectively.

Koc *et al.* (2002) experimented in dogs on the effects of anaesthetic like combination of xylazine and midazolam on certain clinical parameters and reported decrease in rectal temperature, heart rate and respiration rate during midazolam-xylazine anaesthesia.

Williams *et al.* (2002) stated that the use of ketamine, and xylazine for large-scale feral cat neutering has several benefits. The combination was inexpensive easy to administer in a small volume, provided predictable results and in feral cats a low mortality rate.

Ubrahim and Itekin (2002) in dogs, reported that the administration of butorphanol followed by ketamine was equivalent with xylazine plus ketamine for the induction of anaesthesia.

Kerr *et al.* (2004) reported that a grouping of ketamine resulted in similar cardiopulmonary alterations as a xylazine/ketamine regime, and was a suitable alternative for clinical anesthesia of the horse from a cardiopulmonary view point. ketamine created a fall in heart rate.

Neto *et al.* (2004) reported that the positive chronotropic effects of glycopyrrolate resulted in improvement of hemodynamic utility in horses anesthetized with halothane and xylazine. However, prolonged intestinal stasis and colic were the restrictions of its use during anaesthesia.

Kaur and Singh (2004) reported that anaesthesia was induced and maintained with 5 % thiopentone sodium with a production of mean induction dose to 5.0±0.8 mg/kg body wt (i.e. about 50%) in group II. The maintenance dose of thiopentone sodium was 2.17±0.17gm in group I and a total dose of 3.61±0.8 gm

in group II for a surgery of 40.40±10.50 min duration. Both the combinations produced good surgical anaesthesia. The restoration of vital reflex and recovery was quicker in animals of group I as compared to group II by studied the clinical effects of midazolam-ketamine and midazolam-thiopentone anaesthesia in bovines**.** In group I anaesthesia was induced with midazolam (0.1 mg/kg body wt) and ketamine (4.0 mg/kg body wt) administered i/v. In animals of group II, midazolam (0.2 mg/kg body wt, i.v.) followed 5 min later by 5% thiopentone sodium administered to effect. The anaesthesia was maintained with 5% thiopentone sodium in both groups. Midazolam and ketamine produced good quality induction and duration of anaesthesia was 14.9±0.77.min in animals of group I. Midazolam @ 0.2 mg/kg body wt. proved to be a satisfactory preanaesthetic.

Mohan (2006) in dogs , studied for caesarean section by the comparative efficacy of xylazine and xylazine ketamine premedication on propofol anaesthesia.

Emami *et al.* (2007) concluded that in dog the usage of different doses of romifidine was possible without any unexpected outcome, 80 g/kg of romifidine made better onset of anesthesia in comparison to xylazine 1mg/kg and 40 g/kg romifidine i/m.

Khan *et al.* (2007) observed that Glycopyrrolate-xylazine combination produced ataxia in all the animals along with a decrease in spontaneous activity. Four animals went to sternal recumbency. Mild cutaneous analgesia was seen in all the animals. A significant increase in heart rate, MAP and CVP along with a significant reduction in pulse pressure was noticed and concluded that glycopyrrolate offsets the side effect on haemodynamic parameters induced by xylazine in calves of buffalo by studied on clinically healthy male buffalo calves where glycopyrrolate was administered @ 0.01 mg/kg, IM and xylazine was given @ 0.04 mg/kg, IM.

Amarpal *et al.* (2010) studied in New Zealand White rabbits and reported that the medetomidine 250 µg/kg and ketamine 60 mg/kg produced suitable anaesthesia to allow pain free surgery.

Sindak *et al.* (2010) concluded that heart rate, respiration rate, rectal temperature values decreased with good effect of muscular relaxation and positive

anaesthetic conditions during the anaesthesia in Greyhounds by studied the anesthetic effect of the ketamine and xylazine in 8 Greyhounds which were in different age, body weight and sex. The animals were injected with the ketamine (10 mg kg^{-1}) and xylazine (1 mg kg^{-1}) intramuscularly. The Greyhouns of Bozova that injected with ketamine and xylazine had a mean value of 8.33 min induction period and 55.52 min surgical anesthetic duration.

Narayanan *et al.* (2011) reported that midazolam with glycopyrrolate-xylazine combination as preanaesthetic medication produced adequate sedation in dogs and glycopyrrolate-xylazine preanaesthetic combination in ketamine anaesthesia permitted easy endotracheal intubation, resulted in good muscle relaxation and satisfactory depth and duration of anaesthesia and smooth recovery for surgical procedures of short duration by studied on the midazolam with glycopyrrolate-xylazine combination for premedication in ketamine anaesthesia in dogs.

Malik *et al.* (2011) reported that Medetomidine and butorphanol combination provided more dose sparing effect on anaesthetics used for induction and maintenance with shorter recovery times than that of the midazolam-butorphanol combination by studied the Comparative evaluation of halothane anaesthesia in medetomidine-butorphanol and midazolam-butorphanol premedicated water buffaloes (*Bubalus bubalis*) and concluded that anaesthetic drug combinations could be used safely in buffaloes for surgery of 2-hour duration. However, medetomidine (2.5 g/kg) and butorphanol (0.05 mg/kg) provide better sedation, analgesia and muscle relaxation with transient but slightly more cardiac depression than midazolam (0.25 mg/kg) and butorphanol (0.05 mg/kg) when used as preanaesthetics to thiopental and halothane anaesthesia in buffaloes.

Khan *et al.* (2011) in dogs reported on age, effect of sex, pregnancy status, and body condition score on blood cell counts and biochemical value.

Camkerten *et al.* (2013) reported that combinations of ketamine and xylazine was recommended by them for as anesthesia in Bozova greyhounds and on insignificant differences of effects of xylazine-ketamine anesthesia on

heamotological and biochemical parameters in Bozova greyhounds between before and during anesthesia.

Saurab *et al.* (2013) reported that the combination of glycopyrrolate-acepromazine-xylazine-thiopentone could be used to anaesthetize buffaloes, as there were minimal side effects with good anaesthesia.

Mahmud *et al.* (2014) concluded that diazepam alone could be used for less painful surgical procedures and handling in cockerel chickens. However, requiring quite a long time in the cases of more painful surgical procedures and it was safer and strongly recommended of ketamine-diazepam combination dosed at 10 mg/kg IM and 2 mg/kg IM respectively.

Kumar *et al.* (2014) reported that after premedication with dexmedetomidine, a surgical plane of anaesthesia was recorded with ketamine (0.54±0.07 mg/kg/min) and propofol (0.15±0.03 mg/kg/min) total intravenous anaesthesia (TIVAs) for 1h. Both treatments were suitable for producing excellent degree of analgesia. Ketamine TIVA was associated with better haemodynamic stability in comparison to propofol TIVA however in urolithic goats propofol treatment had advantage of excellent sedation and muscle relaxaton.

Chander *et al.* (2014) reported that longer duration of action of the glycopyrrolate was observed that posed an advantage over the use of atropine as a pre-anaesthetic agent and glycopyrrolate was effective in controlling bradycardia incuced by xylazine through vagal blockage, the drug did not counteract the depressant effect of xylazine on cardiac contractility.

Singh *et al.* (2014b) reported significant changes were in total proteins, serum sodium and potassium in addition to heart rate and mean arterial pressure at various intervals by studied on 12 male buffalo calves by administering glycopyrrolate (0.01 mg/kg, i.m.) followed by acepromazine (0.05 mg/kg, i.m.), xylazine (0.04 mg/kg, i.v.) and ketamine (2.0 mg/kg, i.v.). The calves were in sternal recumbency with chin on ground at 1.72±0.74 min of xylazine-ketamine administration. Onset of analgesia and loss of palpebral and corneal reflexes were observed at 8.95±2.69 min and 13.51±2.38 min of xylazine-ketamine

administration respectively. Complete recovery took 48.71±2.83 min after administration of xylazine-ketamine.

Kumar *et al.* (2014) reported that ketofol was an excellent induction agent for general anaesthesia in diazepam premedicated dogs.

Robinson and Borer-Weir (2015) reported that diazepam (0.3-0.5 mg/ kg) administered IV after 2 mg/ kg propofol significantly reduced the propofol dose in cats required for tracheal intubation.

Potliya *et al.* (2015) in buffalo calves reported that Glycopyrrolate - xylazine - propofol anesthetic combination can be safely used for short duration of anaesthesia.

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3 MATERIALS AND METHODS

The present investigation was conducted on twelve adult dogs of different breeds which were clinically unhealthy with different age and weight presented for routine surgery i.e. ovary hysterectomy, pyometra or uterine infection, surgery at department of veterinary surgery and radiology of BVC, at veterinary clinical complex Patna. All the dogs were randomly divided in two groups of six animal each. The standard procedures and required kits were used for haematological and biochemical analysis.

3.1. Preanaesthetic and Anaesthetic drugs used

1. Glycopyrrolate (pyrolate^{R}, 0.2mg/ml, Neon laboratories limited, Mumbai India)

2. Xylazine Hydrochloride (Xylaxin^{R},23.32mg/ml Indian immunological Limited, Hyderabad, India Laboratories Ltd)

3. Diazepam (Calmpose^{R},5mg/ml, Ranbaxy)

4. Thiopental (Thiosol 500^{R}, Neon Laboratories limited, Mumbai India) vial of 0.5 gm, dissolve in 10 ml of sterile water to form 5 percent solution.

3.2. Preanaesthetic Preparation of the Patient

All the dogs were withheld food for twelve hours and water for six hours prior to administration of anaesthetic. The animals were weighted just before the administration of premedicants. Blood samples (2 mL) were collected in sterile, EDTA vial for pathological test and 2ml in serum tube for Biochemical test before preanaesthetic drug administration, after preanaesthetic drug administration, during anaesthesia and during recovery. Blood sample collected from cephalic or saphenous vein of the region of radial and recurrent tarsal vein. During surgery five percent dextrose saline was administered intravenously to all the dogs.

3.3. Combination of Drugs

1. Animals of group I were pre-medicated by administration of glycopyrrolate @ 0.011 mg/kg bwt. i.m., followed by Diazepam @ 0.5mg/kg bwt i.v. after 15 minutes.

2. Animals of group II along with glycopyrrolate and xylazine @ 1.0mg/kg bwt i.m. and diazepam were administered by intravenous route after 15 minutes.

3. In the both groups thiopental was administered @ 10 mg/kg bwt. i.v. for induction & maintenance of general anaesthesia after 2 minutes of pre-medication.

3.4. Experimental Design

All the selected animals were randomly divided into two groups. Group 1st and group 2nd & each group consist of six adult dogs.

Table.3.1. Experimental Design in study

Groups	Drugs
Group 1st	Glycopyrrolate (@0.011mg/kg b.wt.) I/M Diazepam (0.5 mg/kg b.wt.) i/v Thiopental (10 mg /kg b.wt.) i/v
Group 2nd	Glycopyrrolate (@0.011mg/kg b.wt) I/M Xylazine (@1.0mg/kg b.wt.) I/M Diazepam (0.5 mg/kg b.wt.) i/v Thiopental (10 mg /kg b.wt.) i/v

3.5. Parameter of the study

3.5.1. Physiological parameters

1. Temperature (^{0}F)
2. Respiration rate (per minute)
3. Pulse rate (beats per minute)
4. Blood pressure (mm Hg)

5.Capillary refill time (Second)

Physiological observations

Rectal temperature (RT) (^{0}F), pulse rate (beats/min), rate of respiration (breaths/min), capillary refill time (in sec) were recorded before pre anaesthetic drug administration. after pre anaesthetic drug administration (at 17 minutes after the administration of glycopyrrolate), during anaesthesia (at 45 min after the administration of glycopyrrolate) and during recovery (at 130 min after the administration of glycopyrrolate). Pulse rate was recorded by applying the sensor of the pulse oxymeter.

Rectal temperature

The rectal temperature was recorded by using a clinical thermometer and is expressed in degrees of Fahrenheit (^{0}F).

Respiratory rate

Respiratory rate was determined by counting thoracic and abdominal excursions over one minute and expressed as rate per minute.

Pulse rate

Pulse rate was measured by palpation of femoral artery on the medial aspect of thigh and expressed as beats per minutes.

Capillary Refill Time (CRT)

The capillary refill time (CRT) is the time the gums, or other vascular mucous membrane, take to return to normal colour after blanching them with digital pressure. Usually, CRT is 2 seconds or less.

Haemodynamic observations

Systolic blood pressure (SBP), Diastolic blood pressure (DBP) (mm Hg) were recorded using a non-invasive blood pressure monitor.

3.5.2. Haematological parameters

1. Hb (g/dl) using (Sahli's haemoglobinometer).
2. PCV% (Wintrobe's haematocrit method).
3. TLC (10^3/cmm) using (Neubauer's Chamber).
4. TEC (10^6/cmm) using (Neubauer's Chamber)

Haematological observations

Haematological parameters such as total erythrocyte count in millions/cmm (TEC), total leukocytes count in thousands per cumm (TLC) and hemoglobin in grams per cent (Hb) were recorded before premedication, After premedication, during anaesthesia and during recovery from anaesthesia.

Haemoglobin (Hb) grams per cent

Acid hematin (sahli's method) method was used for estimation of haemoglobin. The blood was added to N/10 Hydrochloric acid (HCl), the hemoglobin present in RBCs is converted to acid hematin which is a dark brown colored compound. The color of the formed acid hematin complex corresponds to the Hemoglobin concentration in the blood and is matched with the standard which is a reference brown glass given in the Sahli's apparatus by diluting with N/10 hydrochloric acid or distilled water until the color of acid hematin complex match with the color of the standard (Chakrabarti, 2006).

Packed cell volume in percent

Anticoagulated whole blood is centrifuged in a Wintrobe tube to completely pack the red cells. The volume of packed red cells is read directly from the tube (Chakrabarti, 2006).

Total leukocyte count (TLC) and total erythrocyte count

Total leukocyte count (TLC) ($\times 10^3$/cmm) and total erythrocyte count (10^6/cmm) were estimated by using with haemocytometer with improved Neubauer´s counting chamber (Chakrabarti, 2006).

3.5.3. Biochemical observations

1. SGPT or ALT (U/L)
2. SGOT or AST (U/L)
3. BUN (mg/dl)
4. CREATININE (mg/dl)

SGPT (Modified IFCC Method)

Principle: SGPT (ALAT) catalyzes the transfer of amino group between L-alanine and α keto-glutarate to form pyruvate and glutamate.The pyruvate formed reacts with NADH in the presence of lactate dehydrogenase to form NAD.The rate

of oxidation of NADH to NAD measured as a decrease in absorbance which is proportional to the SGPT activity in the sample. One ml of working reagent mix with 0.1 ml serum. Mixed solution aspirated by autoanalyzer and reading was taken.

SGOT (Modified IFCC Method)

Principle: SGOT (ASAT) catalyzes the transfer of amino group between L-Aspartate and a Ketoglutarate to form Oxaloacetate and Glutamate. The Oxaloacetate formed reacts with NADH in the presence of Malate Dehydrogenase to form NAD. The rate of oxidation of NADH to NAD is measured as a decrease in absorbance which is proportional to the SGOT (ASAT) activity in the sample. One ml of working reagent mix with 0.1 ml serum. Mixed solution aspirated by autoanalyzer and reading was taken.

BUN (GLDH Kinetic Method)

Principle: Urease hydrolyzes urea to ammonia and carbon dioxide. The ammonia formed further combines with α ketoglutarate and NADH to form Glutamate and NAD. The rate of oxidation of NADH to NAD is measured as a decrease in absorbance in a fixed time which is proportional to the urea concentration in the sample. One ml of working reagent mix with 10 µl ml serum. Mixed solution aspirated by autoanalyzer and reading was taken.

Creatinine (Mod. Jaffe's Kinetic Method)

Principle: Picric acid in an alkaline medium reacts with creatinine to form a orange complex with the alkaline picrate. Intensity of the colour formed is directly proportional to the amount of creatinine present in the sample.

3.5.4. Clinical observations

1.Position of eye ball

Position of the eye ball in the animals of different groups was recorded at different intervals of anaesthesia. The position of eye ball was recorded as C (central) or D (downward rotation).

2. Induction Time

The induction time of anaesthesia was calculated as the time from the injection of thiopental to the absence of the pedal reflex (Narayanan *et al.,* 2011).

3. Duration of Surgical Anaesthesia

The duration of surgical anaesthesia is the time interval between the time of disappearance of pedal reflex and the time of return of pedal reflex (Narayanan *et al.*, 2011). During the stage of surgical anaesthesia pain sensation, consciousness and spinal reflexes are abolished. Muscular relaxation occurs and coordinate movement disappears.

4.Recovery time

Recovery time was calculated as the time interval between the return of pedal reflex and the time when the animal could stand up and walk unassisted. (Narayanan *et al.,* 2011).

5.Extent of salivation.

6. Total thiopental dose.

7. Sedation

Sedation was evaluated before induction of anaesthesia and after discontinuation of anaesthesia by observing behavioral changes and were graded on a 0 to 3 scoring scale as follows: (Singh *et al.,*2013).

Table.3.2. Evaluation of Sedation

Score & Scale	Behavioral Changes
0(no sedation)	Alert, eyes open
1(Mild sedation)	Drooping of eyes lids, mild sensory and motor deficit.
2(Moderate sedation)	Drooping of eye lids, moderate sensory and motor deficit.
3(Deep sedation)	Drooping of eye lids, severe sensory and motor deficit.

8. Analgesia

The extent and magnitude of analgesia was ascertained by pin-prick on the rib of the periosteum and at the coronary band. The analgesia was graded on 0 to 3 scoring scale as follows: (Singh *et al.,* 2014)

Table.3.3. Evaluation of Analgesia

Scale & Degree of analgesia		Reaction
0	No analgesia	Strong reaction to pin-prick
1	Mild analgesia	Weak reaction to pin-prick
2	Moderate analgesia	Occasional reaction to pin-prick
3	Excellent analgesia	No reaction to pin-prick.

9. Reflexes

Abolition of palpebral and corneal reflexes, cutaneous reflex, pedal reflex was recorded at different intervals in the animals of different groups. In all the dogs the plane of analgesia was assessed by observing response to various painful stimuli. Presence or absence of reflexes was recorded at before premedication, after premedication, during anaesthesia and during recovery.

Pedal reflex

Presence or absence of pedal reflex was tested by pinching the interdigital webbing of the front and hind limbs approximately for one second with mosquito haemostat forceps.

Palpebral reflex

Palpebral reflex was tested by observing blinking response when eye lids were touched gently with fingers.

Corneal reflex

It was assessed by blinking induced by gently touching the cornea with wet cotton.

10. Depth of Anaesthesia

Depth of anaesthesia was evaluated during surgery by assessing the extent of analgesia, degree of muscle relaxation and unconsciousness, and graded as unsatisfactory, satisfactory, good or very good (Narayanan *et al.,* 2011).

3.6. Statistical analysis

All the collected data was subjected to statistical analysis using SPSS 17. Mean± SE was determined by descriptive statistics method. Single Factor Analysis of Variance (ANOVA), Duncan's multiple range test (DMRT) and t-test were used to compare the means at different time intervals amongst different groups and compare the mean values at different intervals with their respective base values in each group (Snedecor & Cochran 2004).

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4 RESULTS AND DISCUSSION

The present work was carried out to study various clinical, haematological, biochemical, and pulse oximetric alterations following the two different preanaesthetic combinations with thiopental at different time interval in dogs. The pharmacokinetics of thiopental viz., rapid distribution, ultra-short action, rapid metabolism by the liver and rapid reduction in the arterial concentration makes it suitable for total intravenous anaesthesia (Lumb and Jones, 1997). Thiopentone sodium is compatible with several tranquilizers like triflupromazine hydrochloride, diazepam, ketamine hydrochloride and xylazine hydrochloride etc. As an induction agent in small animals, thiopentone along with conventional tranquilizers has several advantages over in achieving desired plane of anaesthesia and analgesia. The drug can be used as a single bolus for induction of surgical plane of anaesthesia in dogs and also for the maintenance of the surgical plane of anaesthesia when desired for longer periods with low incremental doses.

The results of the study are explained under the following headings.

4.1. Physiological Observations

4.1.1. Rectal Temperature

Mean ±SE of rectal temperature in the animals of different groups have been presented in Table.4.1. and fig.4.1. In Group 1 no significant difference was observed in rectal temperature during different periods of interval. In group 2 rectal temperature during anaesthesia significantly decreased as compared to before pre-medication and after pre-medication period. Between groups 1 and 2, no significant difference was observed at different periods of interval. There was decrease in rectal temperature during anesthesia in both the groups but more decrease in body temperature in group 2 in which xylazine was used as pre anesthetic which might be due to peripheral vasodilatation, decrease of basal metabolic rate and muscle tone and depression of thermoregulatory mechanism (Koc *et al.,*2002). The observation made in this study confirms the findings of many workers (Sharma *et al.*, 1983; Mohan, 2006; Sindak *et al.*, 2010), where they

reported a decrease in rectal temperature when xylazine was used with ketamine and midazolam anaesthesia in dogs (Koc *et al.*, 2002). The decrease in body temperature during anaesthesia can be attributed to the depressant effect of the drugs on the central nervous system. Anaesthetic doses of barbiturate produce respiratory depression and lowered body temperature (Lumb and Jones, 1973).

Table.4.1. Mean ±S.E. of Rectal temperature (^{0}F) of dogs at different periods of interval

Period				
Group	**Premedication**		**During Anaesthesia**	**During Recovery**
	Before	**After**		
1	101.21±0.36^{am}	101.28±.36^{am}	100.25±0.37^{am}	100.28±0.24^{am}
2	101.25±0.35^{cm}	100.81±0.37^{bcm}	99.70±0.30^{am}	99.91±0.32^{abm}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

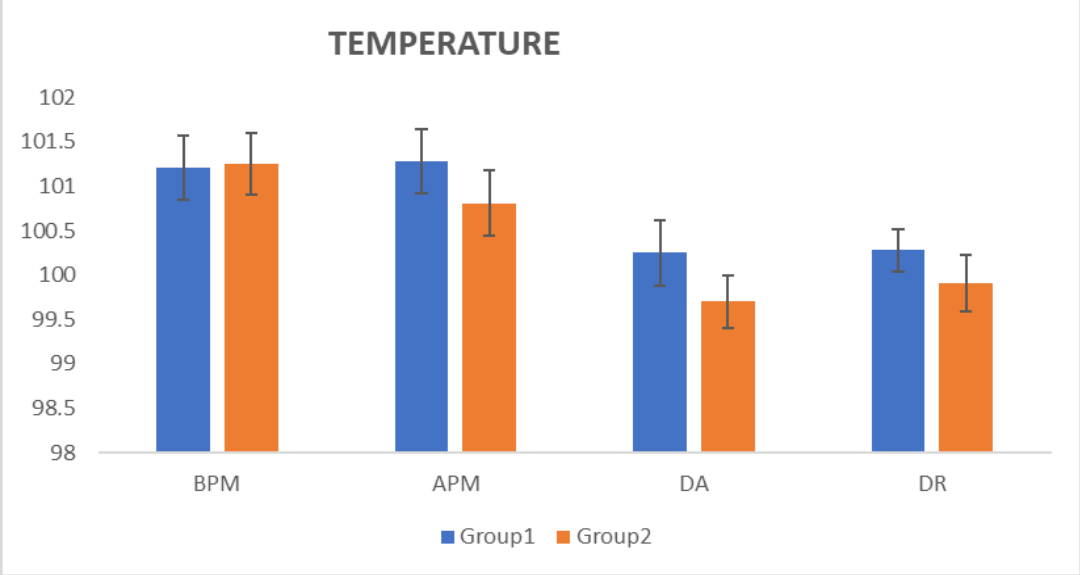

Fig.4.1. Rectal temperature (^{0}F) of dogs at different periods of interval

4.1.2. Respiration Rate

Mean± SE of respiration rate in the animals of different groups have been presented in Table.4.2. and fig.4.2. In group 1, respiration rate during anaesthesia significantly decreased as compared to after pre-medication period. In group 2, respiration rate during anaesthesia significantly decreased as compared to different periods of interval. The comparison between Group 1 and 2 respiration rates significantly decreased in group 2 at different periods of interval except before pre-medication period. Drugs used for anaesthesia must be carefully evaluated for their analgesic properties and effects on basic physiology in the species for which it is used. Among the barbiturates, thiopentone sodium is popularly used in small animal anaesthesia. The initial toxic effects produced by thiopentone anaesthesia is marked depression of the respiratory centers, both rate and amplitude being affected, with decreased pulse rate and blood pressure (Lumb and Jones, 1973).

There was decrease in respiration rate at premedication in group 2 where xylaxine was used as preanaesthetic. Respiratory depression associated with α_2-adrenergic agonists might be secondary to the CNS depression produced by α_2-adrenoceptors stimulation (Sinclair, 2003) or due to direct depression of the respiratory centers by preanaesthetics (Kumar *et al.*,1976; Kumar and Thurmon, 1979;Chitale *et al.,* 1998; Kinjavdekar., 1998) in goats and (Rehage *et al.*, 1994; Skarda *et al.*, 1996) in cattle. During anaesthesia there was significant decrease of respiration rate in both group but more decreased in respiration rate in group 2 due to effect of xylaxine. The observation made in this study confirms the findings of Moens and Fargetton (1990) who observed 27% decrease in the respiration rate at 45 min. after xylazine-ketamine administration in dogs. Decrease in respiration rate following the administration of xylazine (Peshin *et al.*, 1980), xylazine-ketamine (Haskin *et al.*, 1986) and xylazine- midazolam (Koc *et al.*, 2002) had been reported in dogs. In another study, (Sindak *et al.*, 2010), Kul *et al*. (2000) found a prolonged decrease in the respiration rate to 120 min in their study with xylazine-ketamine administration in dogs. The anaesthetic regime of ketamine-xylazine had no significant influence on respiratory rate (Afshar *et al.*, 2005) but

Kul *et al.* (2000) showed significant changes at 15, 30 and 60 min after xylazine-ketamine administration in dogs. Respiratory rate significantly remained lower than baseline throughout the anesthesia in present study which is in conformity with (Haskins *et al.*, 1986; Gleed, 1987; Hall and Clarke, 1991; Tranquili and Benson, 1992; Atalan *et al.*, 2002; Demirkan *et al.*, 2002). Thiopentone administration causes increase in the tidal volume resulting in decrease in the respiratory rate. This may be due to depression of respiratory medullary centres by thiopentone as reported by Berger, (1966) in calves and Singh and Kumar, (1988) in goats.

Table.4.2. Mean ±S.E. of respiration rate (breaths/minutes) of dogs at different periods of interval.

Period				
Group	**Premedication**		**During Anaesthesia**	**During Recovery**
	Before	**After**		
1	26.16±0.60^{bcm}	27.34±0.84^{cm}	24.67±0.61^{bm}	24.67±0.61^{bm}
2	26.50±0.76^{cm}	22.00±0.73^{bn}	17.50±0.76^{an}	22.33±0.71^{bn}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

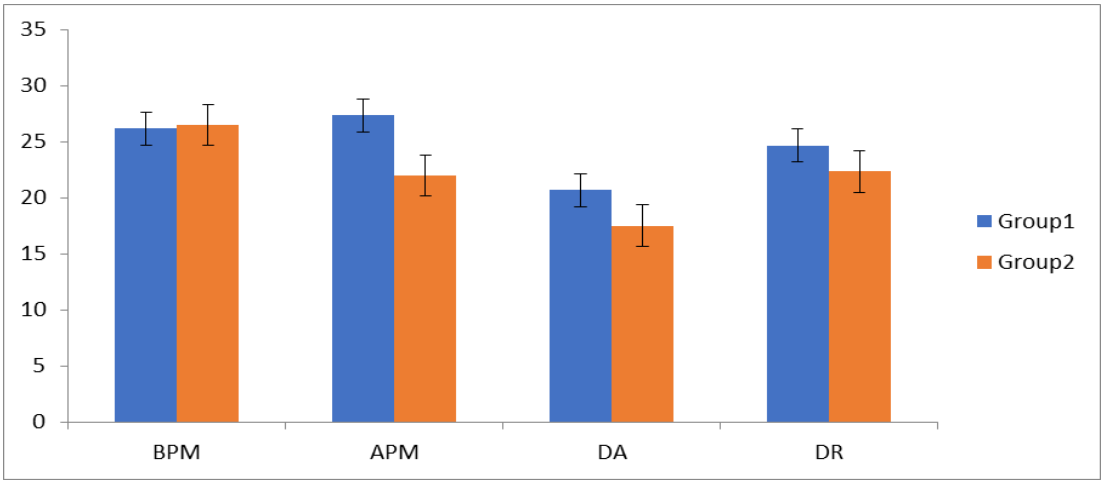

Fig.4.2. Respiration rate (breaths/minute) of dogs at different periods of interval.

4.1.3. Pulse rate

Mean± SE of pulse rate in the animals of different groups have been presented in Table.4.3. and fig.4.3. In group 1, pulse rate was significantly lower during anaesthesia as compared to different intervals of time period. In group 2, pulse rate significantly lower during anaesthesia as compared to different intervals of time period. The comparison between Group 1 and 2, pulse rate significantly decreases in group 1 at different periods of interval.

Changes in the heart rate and rhythm are generally caused by effects of the drug on CNS, autonomic nervous systems or cardiac automaticity and the compensatory response to cardiovascular depression (Shoukas *et al.*, 1984). Reduction in pulse rate after administered of xylazine also reported by Fayed *et al.* (1989) in heifers and Varshney (1998) in ponies. Decrease in pulse rate after administered of xylazine-ketamine anaesthesia is also reported by Sindak *et al.*, (2010). The initial toxic effects produced by thiopentone anaethesia is marked depression of the respiratory centers, both rate and amplitude being affected, with decreased pulse rate & blood pressure (Lumb and Jones, 1973).

Table.4.3. Mean ±S.E. of pulse rate (beats/minutes) of dogs at different periods of interval

Period				
Group	**Premedication**		**During Anaesthesia**	**During Recovery**
	Before	**After**		
1	83.16±0.94^{cm}	87.34±1.25^{dm}	72.34±1.05^{am}	79.17±0.70^{bm}
2	91.34±0.67^{cn}	91.83±0.70^{cn}	86.67±0.67^{an}	89.17±0.60^{bn}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

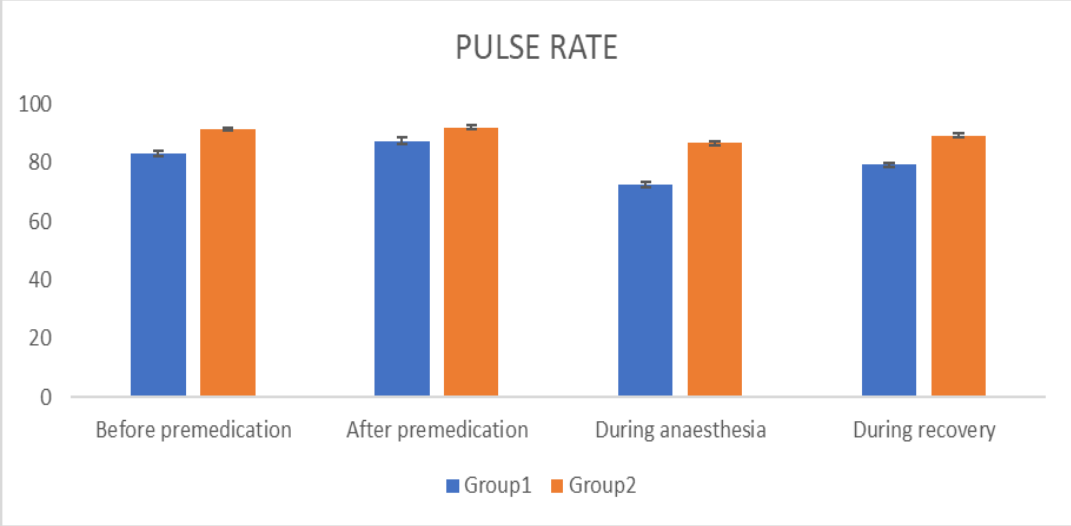

Fig.4.3. Pulse rate (beats/minutes) of dogs at different periods of interval

4.1.4. Blood Pressure

Systolic Blood Pressure

Mean ±SE of systolic blood pressure in the animals of different groups have been presented in Table.4.4. and fig.4.4. In group 1 and 2, the systolic blood pressure decreased significantly during anaesthesia as compared to different periods of interval. The comparison between Group 1 and 2, systolic blood pressure significantly decreased in group 1, after pre-medication and during anaesthesia.

Diastolic Blood Pressure

Mean± SE of Blood Pressure in the animals of different groups have been presented in Table.4.5. and fig.4.5. In group 1 and 2, the diastolic blood pressure decreased significantly during anaesthesia as compared to different periods of interval. In comparison between Group 1 and 2, distolic blood pressure after pre-medication, significantly decreased in group 1.

The systolic blood pressure (SBP) is determined by a combination of peripheral vascular resistance, stroke volume and intravascular volume, whereas diastolic blood pressure (DBP) primarily arises from peripheral vascular resistance. The most common effect of alpha-2 agonist is an initial hypertension

(due to peripheral postsynaptic adrenoreceptors causing vasoconstriction), which results in a baroreceptor-mediated reflex bradycardia. As the peripheral effects diminish, central alpha-2 actions predominate, leading to decreased blood pressure and cardiac output but initially given anticholinergic as glycopyrrolate reduce the bradycardia or causes tachycardia and increase blood pressure. Glycopyrrolate blocks cardiac vagus and thus inhibits cardiac inhibitory effect of xylazine (Khan *et al.* 2007) after xylazine and ketamine anaesthesia administered in horses. Khan *et al.* (2007), found a significant increase in heart rate, MAP and CVP along with a significant reduction in pulse pressure after administration of glycopyrrolate-xylazine anaesthesia in male buffalo calves. Narayanan *et al.*, (2011) reported increase in SBP and DBP after administration of midazolam with glycopyrrolate-xylazine combination premedication in ketamine anaesthesia in dogs.

Contrary to that Luna *et al.* (2000) studied on cardiorespiratory and analgesic effects of romifidine or xylazine combined with ketamine in dogs and noticed hypotension. Kinjavdekar *et al.*, (1998) observed that epidural / Intrathecal administration of α-2 agonists caused dose dependent cardiopulmonary depression.The arterial pressure was significantly decreased after epidural administration of xylazine in goats. The initial toxic effects produced by thiopentone anaethesia is marked depression of the respiratory centers, both rate and amplitude being affected, with decreased pulse rate & blood pressure (Lumb and Jones, 1973).

Table.4.4. Mean ±S.E. of Systolic blood pressure (mmHg) of dogs at different periods of interval

Period				
Group	**Premedication**		**During Anaesthesia**	**During Recovery**
	Before	**After**		
1	125.00±0.89^{cm}	128.00±1.23^{cm}	107.50±1.05^{am}	117.00±1.46^{bm}
2	127.83±1.07^{cm}	152.50±1.17^{dn}	112.67±1.83^{an}	117.67±1.70^{bm}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

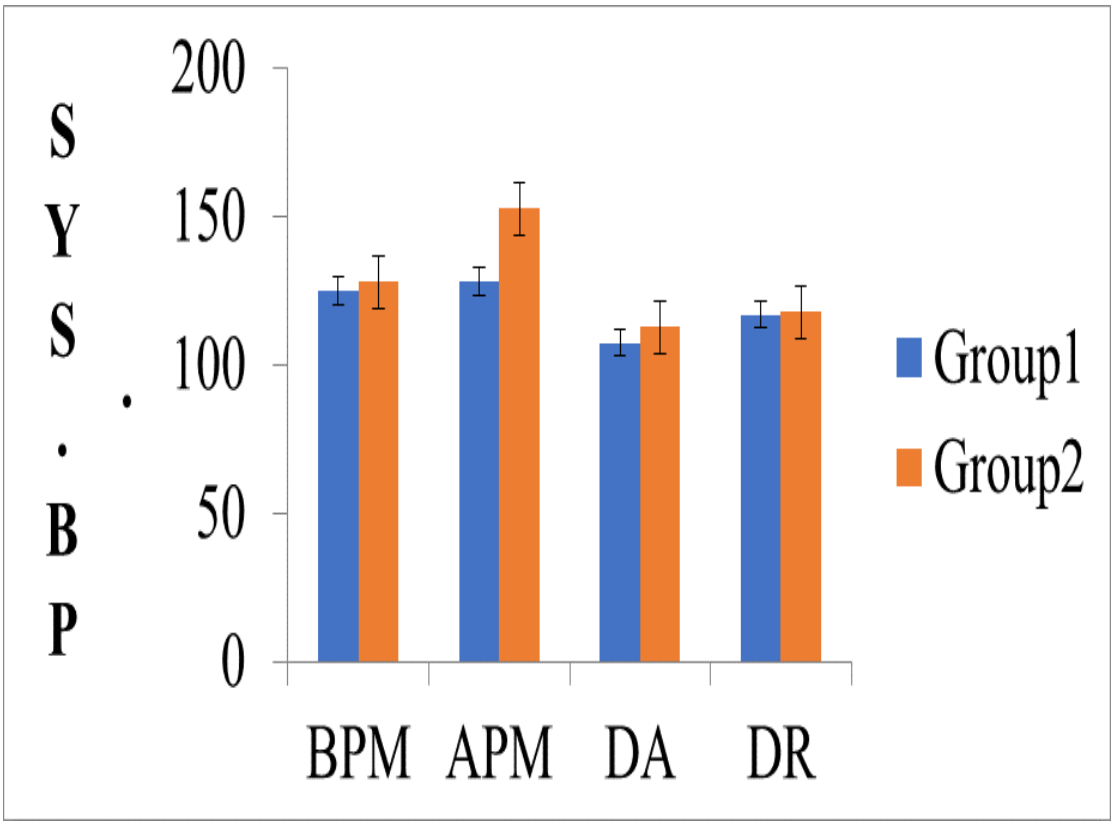

Fig.4.4. Systolic blood pressure (mmHg) of dogs at different periods of Interval

Table.4.5. Mean ±S.E. of Diastolic blood pressure (mmHg) of dogs at different periods of interval

Period				
Group	Premedication		During Anaesthesia	During Recovery
	Before	After		
1	74.00±0.73^{bcm}	75.34±0.61^{cm}	64.67±0.42^{am}	71.16±1.66^{bm}
2	76.00±1.77^{bm}	94.00±1.39^{cn}	66.83±1.47^{am}	73.83±1.27^{bm}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

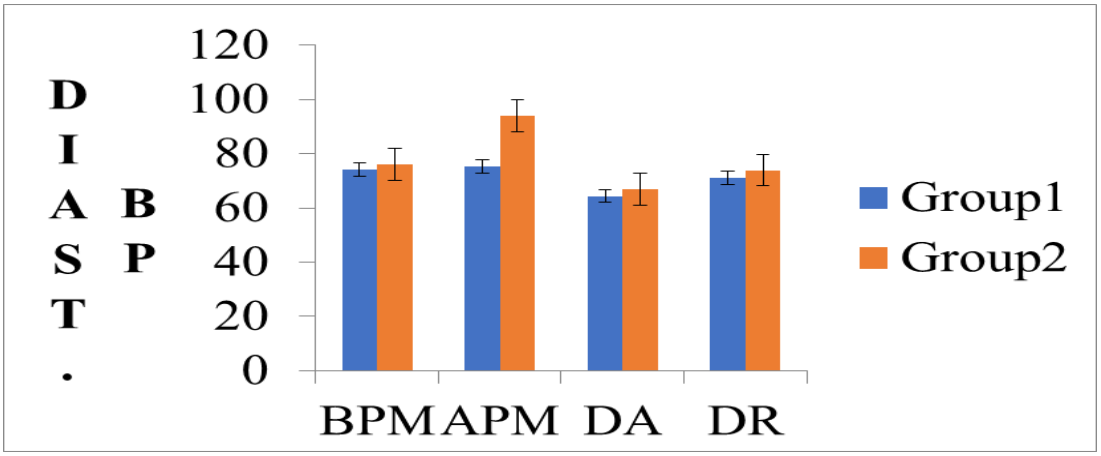

Fig.4.5. Diastolic blood pressure (mmHg) of dogs at different periods of interval

4.1.5. CRT (Capillary Refill time)

Mean± SE of Capillary Refill time in the animals of different groups have been presented in Table.4.6. and fig.4.6. In group 1 and 2, CRT during recovery was significantly lower as compared to different periods of intervals. The comparison between Group 1 and 2, CRT after pre-medication was significantly higher in group 2 as compared to group 1. This increased capillary refill time noticed may be due to the peripheral vasodilatation effect and the loss of muscle tone produced by midazolam -xylazine (Koc *et al.*, 2002). Similar effect was noted by Narayanan *et al.*, (2011) in dogs with glycopyrrolate -xylazine combinations.

Table.4.6. Mean ±S.E. of Capillary refill time (in sec) of dogs at different periods of interval

Period				
Group	**Premedication**		**During Anaesthesia**	**During Recovery**
	Before	**After**		
1	1.80±0.07^{dm}	1.68±0.08^{cm}	1.62±0.08^{bm}	1.55±0.08^{am}
2	1.80±0.08^{dm}	1.72±0.07^{cn}	1.62±0.07^{bm}	1.53±0.09^{am}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

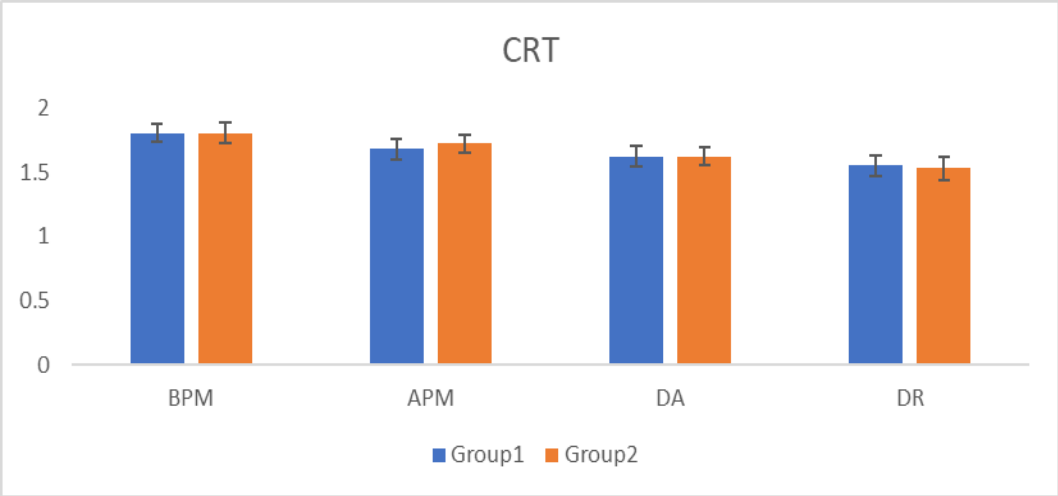

Fig.4.6. Capillary refill time (in sec) of dogs at different periods of interval

4.2. Biochemical Observations

4.2.1. SGPT

Mean ±SE of SGPT in the animals of different groups have been presented in Table.4.7. and fig.4.7. In group 1 non-significant difference was observed during anaesthesia and during recovery but both values was significantly higher than before pre-medication and after pre-medication period. In group 2 non-significant difference was observed after pre-medication and during anaesthesia but both values was significantly lower than during recovery and significantly higher than before pre-medication. In comparison between Group 1 and group 2 SGPT value of group 2 was significantly higher as compared to group one.

4.2.2. SGOT

Mean± SE of SGOT in the animals of different groups have been presented in Table.4.8. and fig.4.8. In group 1 non-significant difference was observed during anaesthesia and during recovery but both values were significantly higher than before pre-medication and after pre-medication period. In group 2 non-significant difference was observed during anaesthesia and during recovery but both values was significantly higher than before pre-medication and after pre-medication. Least SGOT value was found before pre-medication period. In comparison between Group 1 and group 2 non-significant difference was observed after pre-

medication during anaesthesia and during recovery but in group 2, SGOT value before pre-medication was significantly lowered as compared to group 1.

4.2.3. BUN

Mean± SE of in BUN the animals of different groups have been presented in Table.4.9. and fig.4.9. In group 1 non-significant difference was observed before pre-medication and after pre-medication but blood urea nitrogen value was significantly increasing during anaesthesia and during recovery. In group 2 BUN values significantly increased after pre-medication during anaesthesia and during recovery. In comparison between Group 1 and group 2, BUN value after pre-medication, during anaesthesia and during recovery was significantly higher in group 2 as compared to group 1.

4.2.4. Creatinine

Mean ± SE of creatinine in the animals of different groups have been presented in Table.4.10. and fig.4.10. In group 1 and 2 non-significant differences were observed during anaesthesia and during recovery but both values was significantly higher than before pre-medication and after pre-medication. In comparison between Group 1 and group 2 creatinine value did not differ significantly at different periods of interval.

Gary and Tresnewsky (1983) stated that barbiturates were known to alter the normal physiological system especially hepatic and renal function in man and laboratory animals. Singh et. al. (1996) reported increased levels of serum urea nitrogen in goats anaesthetized with a sedative and thiopentone combination. Rao et. al. (2002) recorded significant increase in BUN values during thiopentone anaesthesia in detomidine premedicated dogs. The values of BUN returned to normal in 48 to 72 hours. Pandey and Sharma (1994) observed increased levels of BUN at 4 and 24 hours postanaesthesia with ketamine after premedication with atropine and diazepam in bitches. Blood urea nitrogen values significantly increased in the early and later periods of observation in both barbiturate and ketamine combinations. Similar findings were also reported in goats (Singh and Kumar1988, Kelawala *et. al.* 1991) and in dogs (Pandey and Sharma 1994). The fluctuations in creatinine values had no consequence since the values were with

in normal limits in both the anaesthetic combinations. Similar findings were also reported by Srivastava *et. al.* (1988), Kelawala *et. al.* (1991) and Kumar *et. al.* (2001a) Fasting and anaesthesia causes mild depression of kidney function (Kumar *et. al.*1974). Thiobarbiturates increase systemic vascular resistance but decrease renal vascular resistance with no net change in renal blood flow. Renal responses to anaesthetics also depend upon the pre-existing hydration status and quantity of perioperative fluids administered (Lumband Jones 1997)

Table.4.7. Mean ±S.E. of SGPT (U/L) of dogs at different periods of interval

Group	Premedication		During Anaesthesia	During Recovery
	Before	After		
1	16.35±1.10^{am}	16.48±1.10^{am}	22.55±1.06^{bm}	24.60±1.10^{bm}
2	21.05±0.66^{an}	25.48±0.49^{bn}	27.10±0.67^{bcn}	28.85±0.65^{cn}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

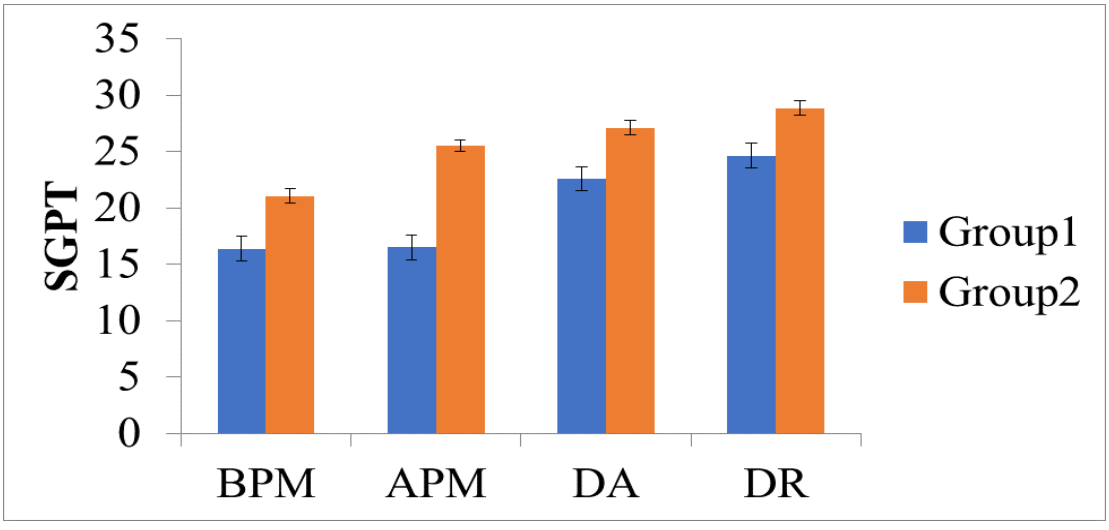

Fig.4.7. SGPT (U/L) of dogs at different periods of interval

Table.4.8. Mean ±S.E. of SGOT (U/L) of dogs at different periods of interval

Group	Premedication		During Anaesthesia	During Recovery
	Before	After		
1	28.84±0.76^{am}	29.68±0.65^{am}	34.78±0.34^{bm}	35.67±0.40^{bm}
2	25.44±0.59^{an}	29.97±0.80^{bm}	35.11±0.38^{cm}	36.38±0.51^{cm}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

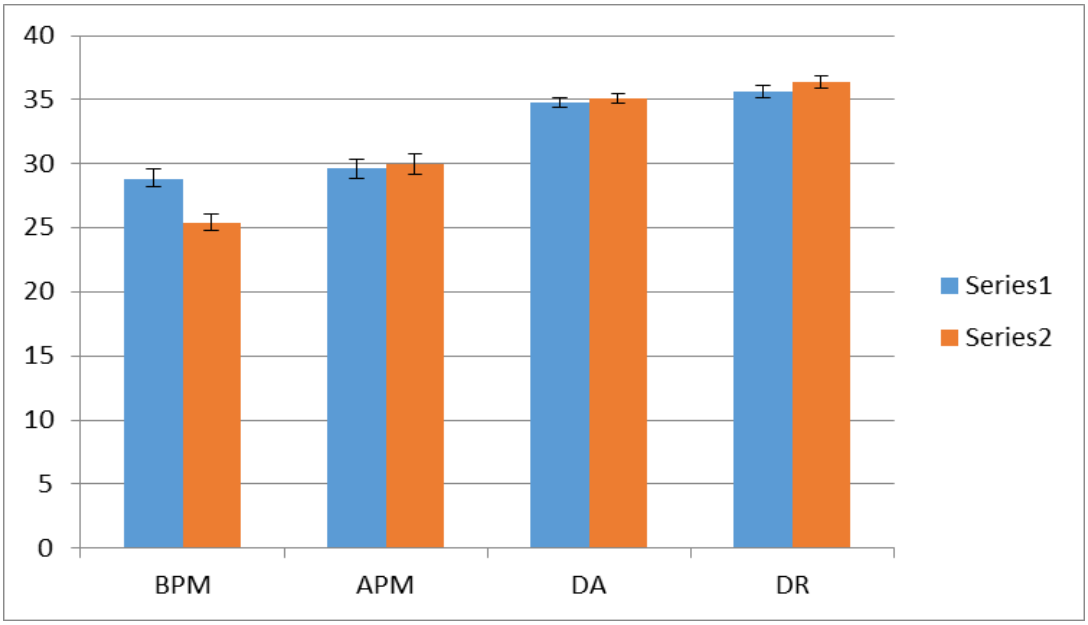

Fig.4.8. SGOT (U/L) of dogs at different periods of interval

Table.4.9. Mean ±S.E. of BUN (mg/dl**) of dogs at different periods of interval**

Period				
Group	Premedication		During Anaesthesia	During Recovery
	Before	After		
1	25.93±0.57^{am}	26.39±0.58^{am}	31.03±.0.57^{bm}	32.77±0.35^{cm}
2	25.76±0.61^{am}	29.22±0.64^{bn}	33.46±0.67^{cn}	35.42±0.41^{dn}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

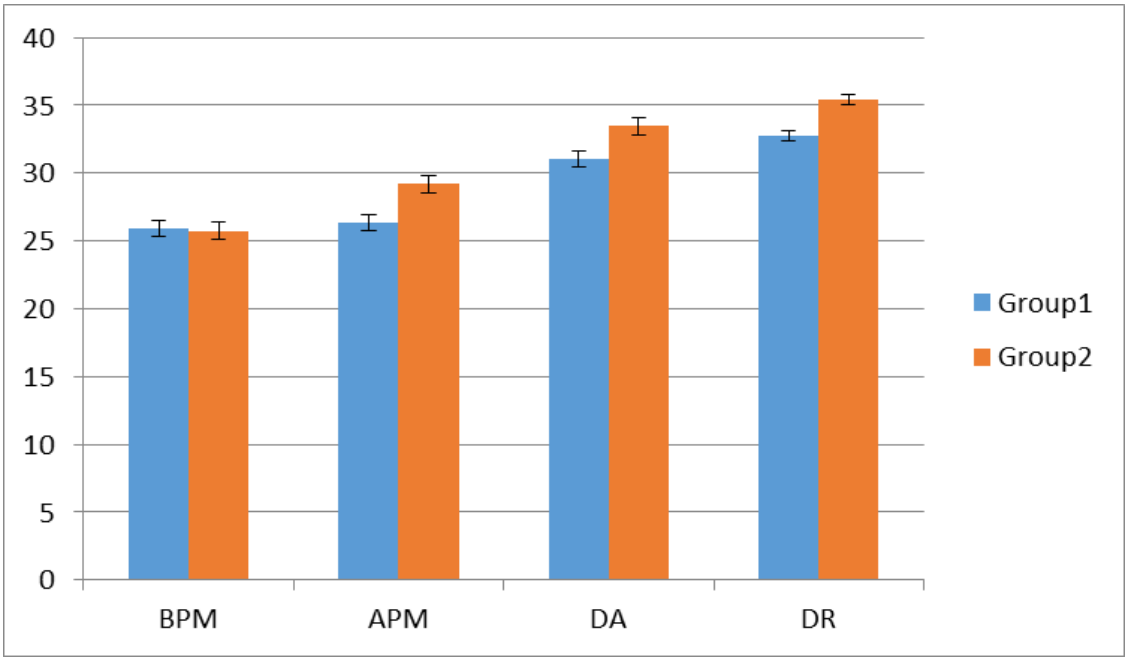

Fig.4.9. BUN (**mg/dl**) **of dogs at different periods of interval**

Table.4.10. Mean ±S.E. of Serum Creatinine (mg/dl) of dogs at different periods of interval

Period				
Group	**Premedication**		**During Anaesthesia**	**During Recovery**
	Before	**After**		
1	0.65±0.016^{am}	0.67±0.016^{am}	0.72±0.016^{bm}	0.74±0.018^{bm}
2	0.64±0.014^{am}	0.67±0.013^{am}	0.75±0.021^{bm}	0.78±0.020^{bm}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

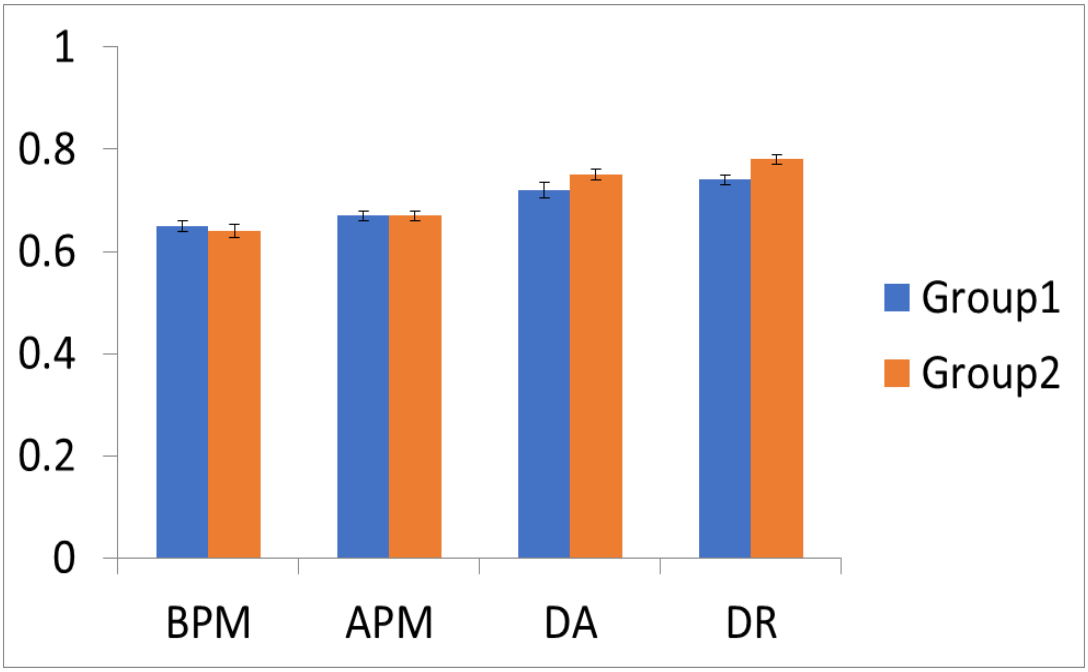

Fig.4.10. Serum Creatinine (mg/dl) of dogs at different periods of interval

4.3. Haematological Obsevations

4.3.1. Haemoglobin

Mean ±SE of Haemoglobin in the animals of different groups have been presented in Table.4.11. and fig.4.11. In group 1 and 2 Haemoglobin decreased significantly during anaesthesia as compared to before pre-medication period. The comparison between Group 1 and 2 no significant difference was observed in haemoglobin at different periods of interval.

Table.4.11. Mean ±S.E. of Haemoglobin (gm/dl**) of dogs at different periods of interval**

Period				
Group	**Premedication**		**During Anaesthesia**	**During Recovery**
	Before	**After**		
1	12.80±0.28^{bm}	12.65±0.29^{abm}	11.88±0.23^{am}	12.17±0.25^{abm}
2	12.79±0.28^{am}	12.21±0.30^{abm}	11.79±0.27^{bm}	12.25±0.30^{abm}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

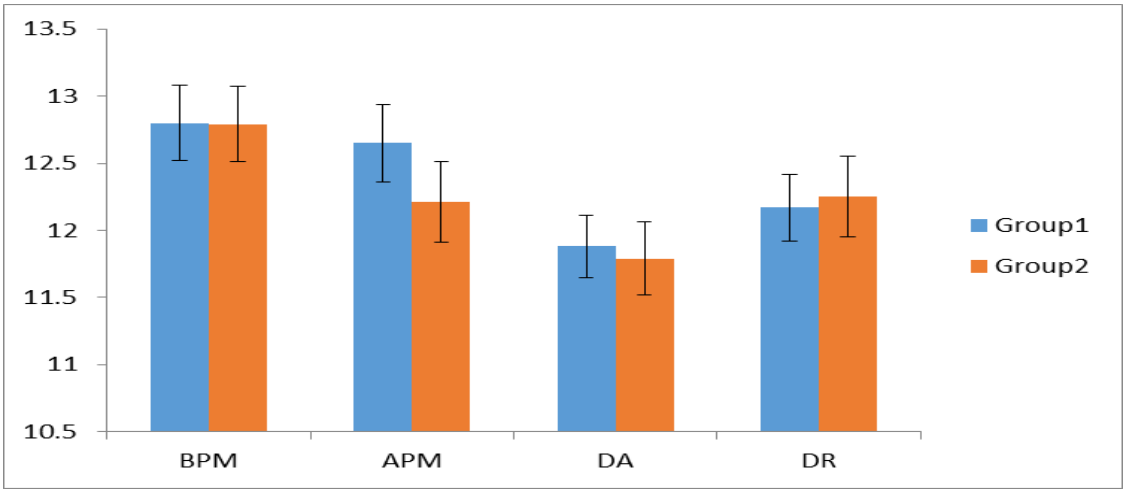

Fig.4.11. Haemoglobin (gm/dl) of dogs at different periods of interval

4.3.2. PCV (Packed Cell Volume)

Mean± SE of in PCV the animals of different groups have been presented in Table4.12. and fig.4.12. In group 1 non-significant difference was observed during anaesthesia and during recovery but both values were significantly lower than before pre-medication and after pre-medication period. In group 2 during anaestheia PCV value were significantly lower as compared to different periods of interval. Non-significant difference was observed in between groups at different time interval.

Table.4.12. Mean ±S.E. of PCV (%) of dogs at different periods of interval

Group	Premedication		During Anaesthesia	During Recovery
	Before	After		
1	39.69 ± 0.72^{bm}	39.37 ± 0.79^{bm}	35.21 ± 0.32^{am}	36.87 ± 0.42^{am}
2	39.62 ± 0.50^{cm}	39.08 ± 0.54^{cm}	34.63 ± 0.38^{am}	37.05 ± 0.11^{bm}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

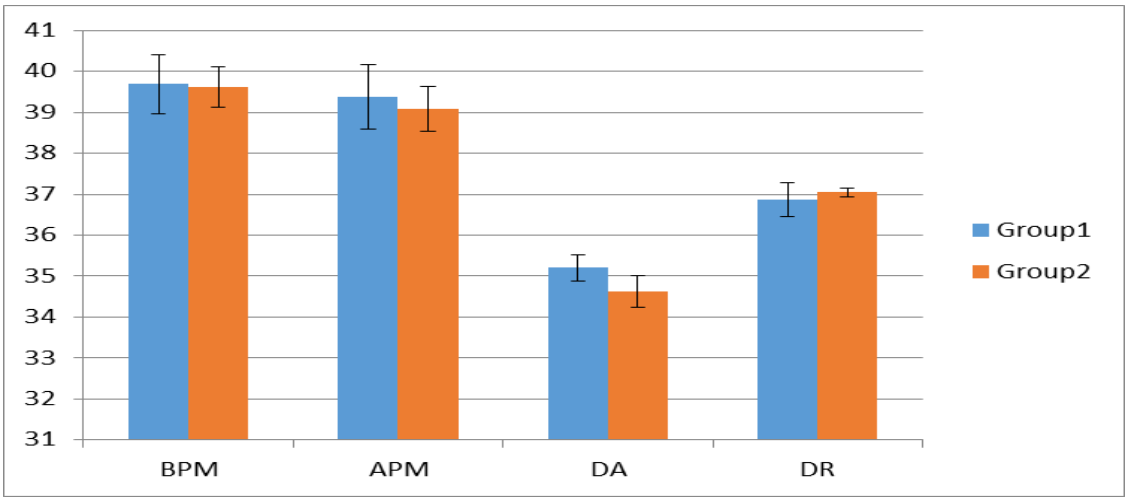

Fig.4.12. PCV (%) of dogs at different periods of interval

4.3.3. TLC (Total Leucocyte Count)

Mean± SE of TLC in the animals of different groups have been presented in Table.4.13. and fig.4.13. In group 1 non-significant difference was observed during anaesthesia and during recovery but these values were significantly lower as compared to before pre-medication and after pre-medication period. In group 2 total leucocyte count during anaesthesia was significantly lower as compared to before pre-medication and after premedication periods of interval. The comparison between Group 1 and 2 non-significant difference was observed at different periods of interval.

Table.4.13. Mean ±S.E. of Total leucocyte count (10^3 /cmm**) of dogs at different periods of interval**

Group	Premedication		During Anaesthesia	DURING Recovery
	Before	After		
1	15.27 ± 0.45^{bm}	15.21 ± 0.44^{bm}	13.43 ± 0.35^{am}	13.77 ± 0.32^{am}
2	15.15 ± 0.51^{bm}	14.98 ± 0.54^{bm}	13.34 ± 0.47^{am}	13.91 ± 0.50^{abm}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

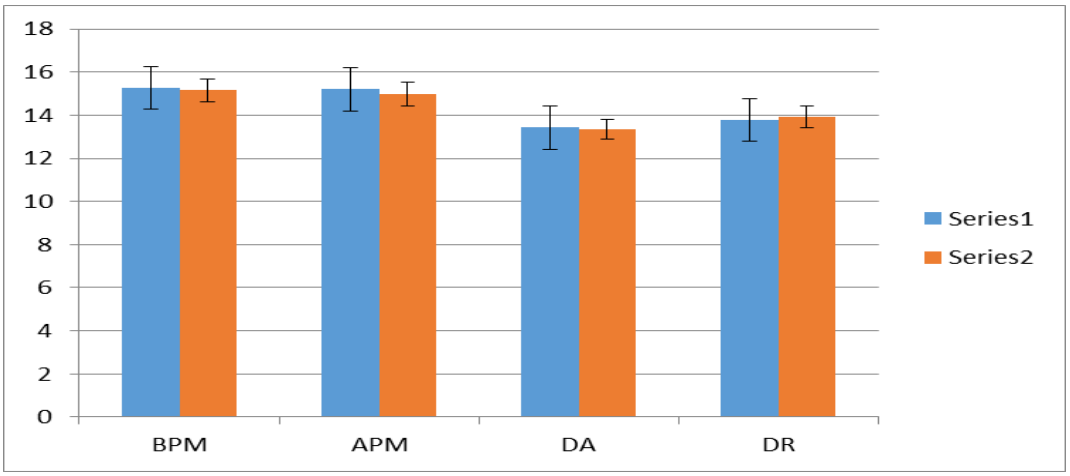

Fig.4.13. Total leucocyte count (10^3 /cmm**) of dogs at different periods of interval**

4.3.4. TEC (Total Erythrocyte Count)

Mean ±SE of TEC in the animals of different groups have been presented in Table.4.14. and fig.4.14. In group 1 total erythrocyte count during anaesthesia was significantly lowered as compared to before pre-medication period and after pre-medication periods of interval. In group 2 total erythrocyte count during anaesthesia was significantly lowered than different periods of intervals. The comparison between Group 1 and 2 total erythrocyte count after pre-medication and during anaesthesia was significantly lower in group 2 as compared to group one.

Table.4.14. Mean ±S.E. of Total erythrocyte count (10^6 /cmm**) of dogs at different periods of interval**

Group	Premedication		During Anaesthesia	During Recovery
	Before	After		
1	6.95 ± 0.037^{bm}	6.94 ± 0.036^{bm}	6.79 ± 0.027^{am}	6.85 ± 0.043^{abm}
2	7.00 ± 0.022^{cm}	6.76 ± 0.032^{bn}	6.49 ± 0.071^{an}	6.72 ± 0.061^{bm}

Values bearing same superscript in a row (a-d) & column (m-n) did not differ significantly (P>0.05).

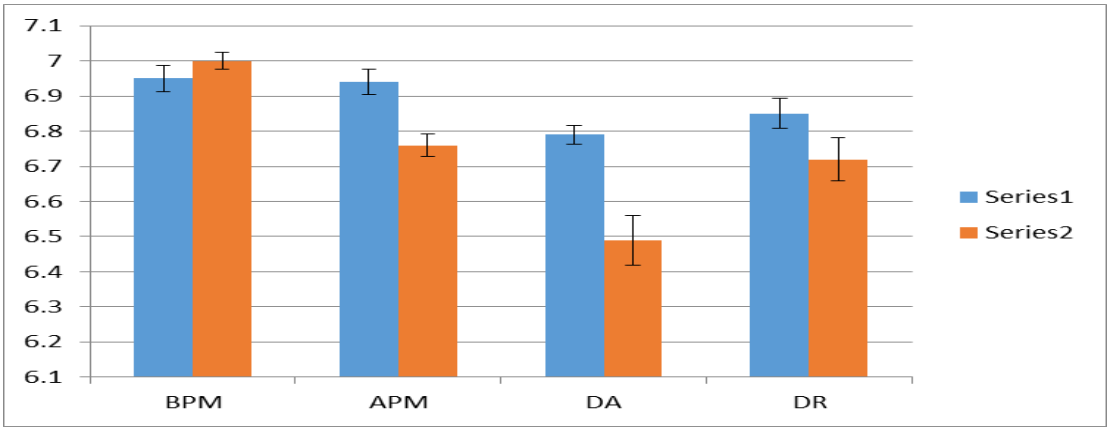

Fig.4.14. Total erythrocyte count (10^6 /cmm**) of dogs at different periods of interval**

Haemoglobin, PCV, TEC and TLC decreased significantly in both groups during anaesthetic period. Pooling of circulatory blood cells in the spleen or other reservoirs secondary to sympathetic activity may explain the decrease in Hb, PCV, TEC and TLC recorded in the present study (Wagner *et al.*, 1991). The decrease in PCV and Hb during anaesthesia or sedation may be caused by the shifting of fluid from the extravascular compartment to the intravascular compartment in order to maintain normal cardiac output (Wagner *et al.,* 1991). Similar findings were also noted in dogs after administration of propofol, xylazine (Cwiek *et al.*, 2009). Demirkan *et al.*, (2002), recorded that a decrease packed cell volume (haematocrit). Gulanber *et al.*, (2001) and Atalan, *et al.* (2002) observed significant decrease of hematocrit percentage when combination of ketamine-xylazine used. During general anaesthesia the spleen usually expands, a process that can cause erythrocyte sequestration and a lowering of haematocrit and haemoglobin concentration. In the present study, inter-compartmental fluid shift or splenic pooling of cells might have occurred and caused a decrease in Hb, PCV, TEC and TLC.

Similar effect was reported after administration of fentanyl with xylazine, medetomidine and dexmedetomidine in isoflurane-anaesthetised water buffaloes (Singh *et al.*, 2013) and xylazine and midazolam on propofol-halothane anaesthesia in dogs (Singh *et al.*, 2014). The haematological parameters showed a non-significant decreasing tendency throughout the observation period irrespective of the anaesthetic combination. Dilatation of the spleen and concomitant pooling of RBC in spleen was reported during barbiturate anaesthesia (Haussner *et. al.* 1938). Bhargava *et. al.* (1986) and Tiwari *et. al.* (1996) also recorded significant decrease in haematological parameters in calves and dogs following injection of thiopentone sodium combinations. Jacobson (1983), Kumar *et. al.* (1985) Increased plasma volume during anaesthesia with resultant vasodilation and vascular pooling also contribute to decrease in haematological parameters (Steffy *et. al.,* 1976, Balagopalan *et. al.,* 1990).

4.4. Clinical Observations

4.4.1. Induction Time

Mean ± SE of induction time in the animals of different groups have been presented in Table.4.15. and fig.4.15. The induction time of anaesthesia was found quicker in group II dogs (1.89±0.34) than in the group I (2.78± 0.38) (Table- 12). Diazepam; a benzodiazepine derivative has been reported to be a good preanaesthetic, sedative and muscle relaxant in calves (Mirakhur *et al.* 1984; Bhargawa *et al.* 1986). Diazepam was administered @0.4 mg/ Kg body weight, slowly, which produced fairly smooth induction with thiopentone anaesthesia. The sedative and analgesic activities of xylazine were related to CNS depression mediated by alpha-2-receptors (Lumb and Jones, 1997). Xylazine-barbiturate combination produced smooth and rapid induction, which indicates the depressant effects of each drug are synergistic to each other.

Table.4.15. Mean ±S.E. Induction time of dogs in both groups.

Group	Induction time (minutes)	Standard Deviation
1	2.78 ± 0.15^{m}	± 0.38
2	1.89 ± 0.14^{n}	± 0.34

Values bearing different superscript in a column(m-n) differ significantly (P<0.05).

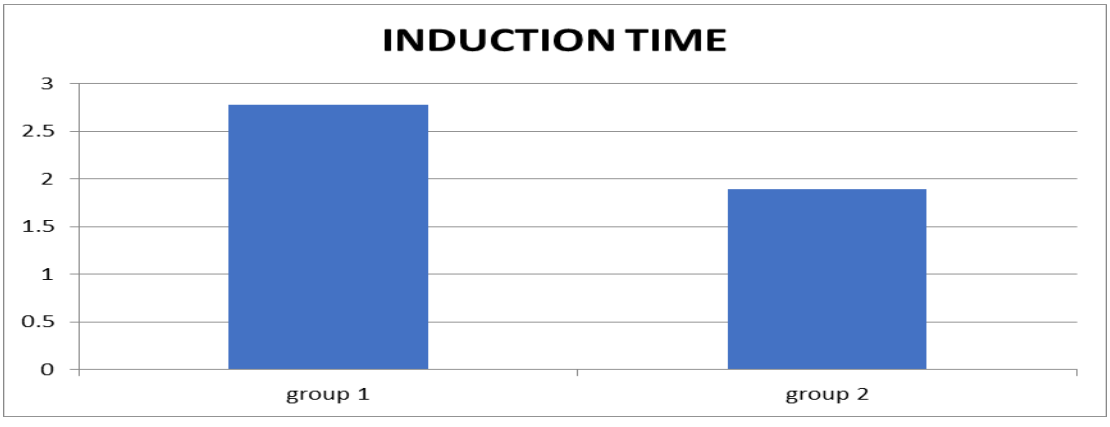

Fig.4.15. Induction time(minutes**) of dogs of different groups**

4.4.2. Duration of Anaesthesia

Mean ± SE of duration of anaesthesia in the animals of different groups have been presented in Table.4.16. and fig.4.16. The duration of anaesthesia was found prolonged in group II dogs (49.11±6.67) than the group I (39.52±4.96) (Table.4.16).

Premedication of diazepam is useful in reducing the dose of thiopentone, prolongation of duration of anaesthesia and postanaesthetic depression (Kandpal and Kumar,1998). Xylazine premedication to thiopentone anaesthesia decreased the amount of barbiturate and improved the level of analgesia, duration of anaesthesia and muscle relaxation (Cruz, 1991).

Table.4.16. Mean ±S.E. Duration of Anaesthesia of dogs in both groups.

Group	Duration of Anaesthesia (minutes)	Standard Deviation
1	39.52±2.02 ^{m}	±4.96
2	49.11±2.71 ^{n}	±6.67

Values bearing different superscript in a column(m-n) differ significantly (P<0.05).

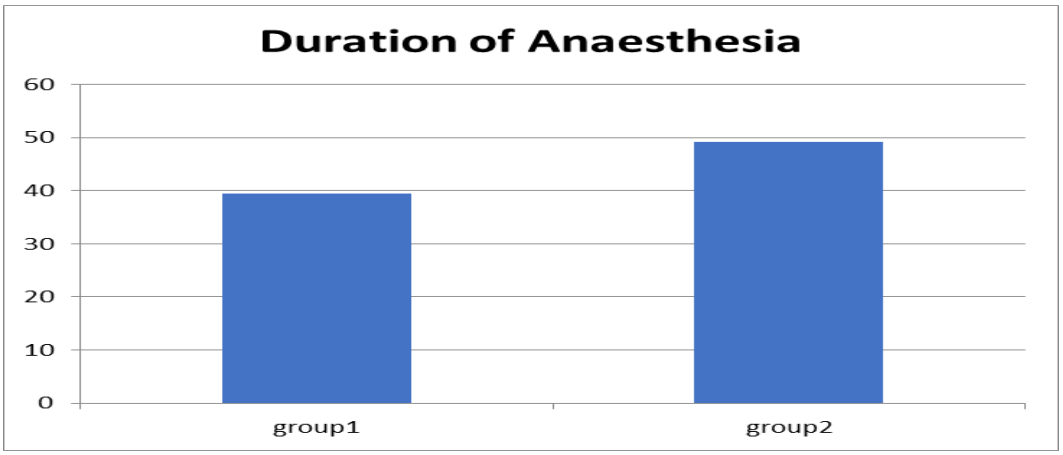

Fig.4.16. Duration of anaesthesia (minutes**) of dogs of different groups**

4.4.3. Recovery Time

Mean ± SE of recovery time in the animals of different groups have been presented in Table.4.17. and fig.4.17. The recovery time was found more in group I dogs (76.83±5.26) than the group II (68.00±3.89) (Table.4.17).

Diazepam premedication is useful in reducing the dose of thiopentone, prolongation of duration of anaesthesia and postanaesthetic depression so recovery will be late. (Kandpal and Kumar, 1998).

Table.4.17. Mean ± S.E. Recovery Time of dogs in both groups.

Group	Recovery Time (minutes)	Standard Deviation
1	76.83±2.15 ^{m}	±5.26
2	68.00±1.59 ^{n}	±3.89

Values bearing different superscript in a column(m-n) differ significantly(P<0.05).

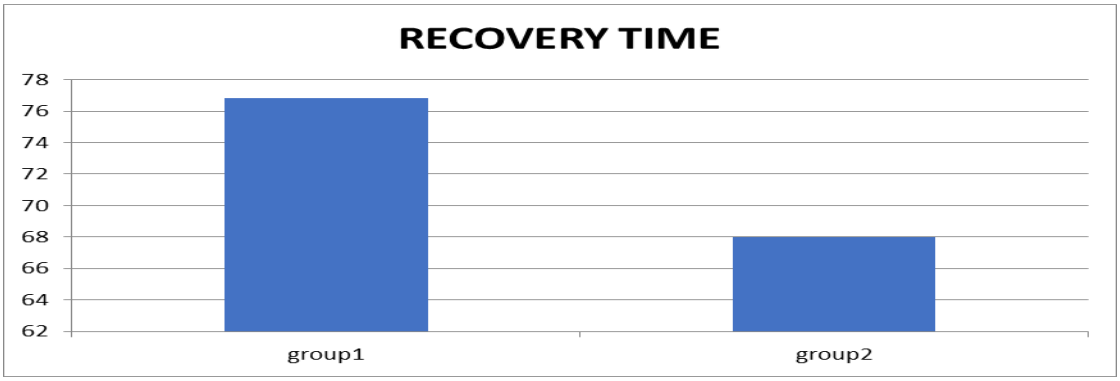

Fig.4.17. Recovery time (minutes**) of dogs of different groups**

4.4.4. Position of eye ball

In group I and group II the eye balls were fixed downward during anaesthesia, and fixed centrally positioned during recovery as well as before premedication. The position of eye balls in the dogs of both the groups have been presented in Table.4.18.

Table.4.18. Clinical observation of eye ball position in the animals of different groups.

Group	Period			
	Before premedication	After premedication	During anaesthesia	During recovery
1	Central	Central	Downward	Central
2	Central	Slightly Downward	Downward	Central

4.4.5. Reflexes

Different reflexes recorded in the animals of group I have been presented in Table.4.19. In group I, the corneal, pedal, palpebral and cutaneous reflexes were present after preanaesthetics drug administration. During anaesthesia all reflexes were absent and during recovery all reflexes were present.

Different reflexes recorded in the animals of group II has been presented in Table.4.20. In group II, the corneal and palpebral reflexes were moderately depressed after preanaesthetics drug administration. During anaesthesia all reflexes were absent and during recovery all reflexes were present.

Corneal and palpebral reflexes were present after preanaesthetics in groupI animals, similar observation reported by Edwin, (1996) after administration of xylazine-ketamine anaesthesia in a German Shepherd dog. Muir *et al.* (1977) also reported similar observation after xylazine-ketamine anaesthesia in horses. Corneal and palpebral reflexes were moderately depressed after preanaesthetics in group II animals.

Table.4.19. Clinical observation on different reflexes in the animals of group 1.

Period	Pedal Reflex	Corneal Reflex	Palpebral Reflex	Cutaneous Reflex
Before Premedication	Present	Present	Present	Present
After premedication	Present	Present	Present	Present
During Anaesthesia	Absent	Absent	Absent	Absent
During Recovery	Present	Present	Present	Present

Table.4.20. Clinical observation on different reflexes in the animals of group 2.

Period	Pedal Reflex	Corneal Reflex	Palpebral Reflex	Cutaneous Reflex
Before Premedication	Present	Present	Present	Present
After premedication	Present	Depressed	depressed	Present
During Anaesthesia	Absent	Absent	Absent	Absent
During Recovery	Present	Present	Present	Present

4.4.6. Depth of Anaesthesia

The depth of anaesthesia was satisfactory in group II, but was not satisfactory in animals of group I. Diazepam has poor tranquilizing effect (Suresh, 2003). Xylazine premedication to thiopentone anaesthesia decreased the amount of barbiturate and improve the level and depth of analgesia (Cruz, 1991).

4.4.7. Analgesia

The animals of both groups showed mild to excellent analgesia. The analgesia score was significantly more in group II (3 ± 0) than group I (1.45±0.15). It is well documented that α_2- agonists produce analgesia by stimulating receptors at various sites in the pain pathway within the brain and spinal cord (Stenberg, 1989). The sedative and analgesic activities of xylazine were related to CNS depression mediated by alpha-2 receptors (Lumb and Jones, 1997).

4.4.8. Sedation

Sedation was observed after administration of preanaesthetics agents in group I and II. Sedative action of xylazine was due to stimulation of α_2-adrenoceptors which caused release of nor-epinephrine or nor adrenaline in the CNS (Lumb and Jones, 1996). Score of sedation was more in group II (2.90 ± 0.15) than group I (1.42 ± 0.10) which might be due to added action of xylazine. Tranquilli *et al.*, (1990) also reported on depressant effect of midazolam and xylazine on the CNS in dogs.

4.4.9. Total dose of Thiopental

Mean ± SE dose of thiopental in the animals of different groups have been presented in Table.4.21. and fig.4.18. The total dose of thiopental for induction and maintenance was found less in group II dogs (4.51±0.40 ml) than in the group I (8.35±0.50 ml). Comparison between group I and group II revealed significant difference ($P<0.01$) in the total dose of thiopental for induction and maintenance. Xylazine premedication to thiopentone anaesthesia decreased the amount of barbiturate and improved the level of analgesia (Cruz, 1991).

Table.4.21. Mean ±S.E. Total dose of thiopental of dogs in both groups

Group	Total thiopental dose (ml)	Standard Deviation
1	8.35±0.50 ^{m}	±1.23
2	4.51±0.40 ^{n}	±0.99

Values bearing different superscript in a column(m-n) differ significantly (P<0.01).

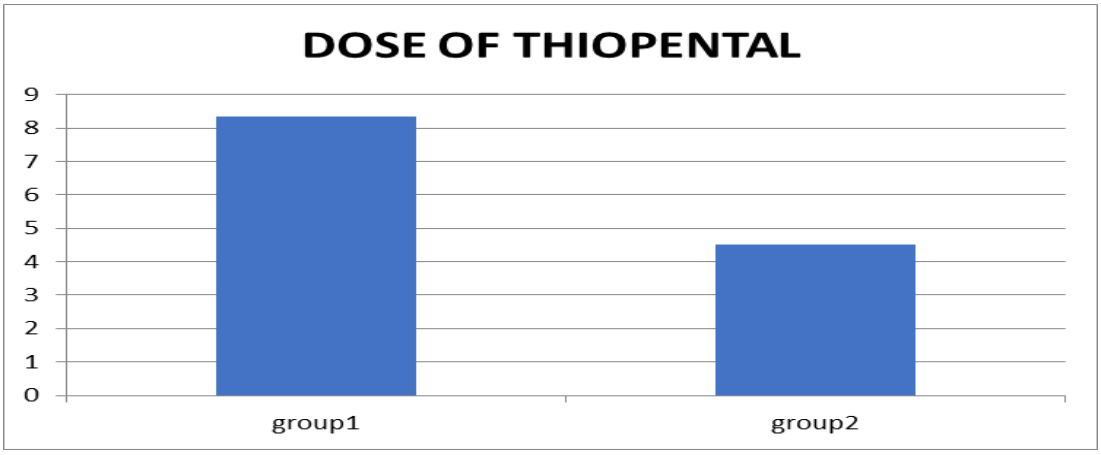

Fig.4.18. Total thiopental dose (ml) of dogs of different groups

4.4.10. Salivation

The salivation during sedation period was not found in any animals in both groups.

The salivation during sedation period was not found in any groups due to antisialogogue effect of glycopyrrolate. Wantey *et al.* (1987) reported that glycopyrrolate is probably the anticholinergic agent of choice in comparision of atropine in canine.

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5

SUMMARY AND CONCLUSIONS

The present investigation was conducted on 12 adult dogs of different breeds which were clinically unhealthy with different age and weight presented for routine surgery i.e. ovary hysterectomy, pyometra or uterine infection, surgery at department of veterinary surgery and radiology of BVC, at veterinary clinical complex Patna. All the dogs were randomly divided in two groups of six animal each. The standard procedures and required kits were used for haematological and biochemical analysis.

Animals of group I were pre-medicated by administration of glycopyrrolate @ 0.011 mg/kg bwt. i.m., followed by Diazepam @ 0.5mg/kg bwt i.v. after 15 minutes. Animals of group II along with glycopyrrolate and xylazine @ 1.0mg/kg bwt i.m. and diazepam was administered by intravenous route after 15 minutes. In the both groups thiopental was administered @ 10 mg/kg bwt. i.v. for induction & maintenance of general anaesthesia after 2 minutes of pre-medication.

The evaluation of anaesthesia was made on the basis of induction time, duration of anaesthesia, recovery time, muscle relaxation, depth of sedation, level and magnitude of analgesia, rectal temperature, pulse rate, rate of respiration, capillary refill time, diastolic blood pressure (DBP), systolic blood pressure (SBP) (mm Hg) , different reflexes like corneal, palpebral, pedal and position of eye ball before preanaesthetic drug administration, after preanaesthetic drug administration, during anaesthesia and during recovery.

Haematological evaluation included haemoglobin (g/dl), packed cell volume (%), total leukocyte count (10^3/cmm) and total erythrocyte count (10^6 /cmm) before preanaesthetic drug administration, after preanaesthetic drug administration, during anaesthesia and during recovery.

Biochemical evaluation included ALT (U/L), AST (U/L), BUN (mg/dl) and Serum creatinine (mg/dl) before preanaesthetic drug administration, after preanaesthetic drug administration, ,during anaesthesia and during recovery.

Clinical examination revealed that induction of anaesthesia was smooth in both the groups. The induction time of anaesthesia was found quicker in group II dogs (1.89±0.34 min.) than in the group I (2.78 ± 0.38 min.). The depth of anaesthesia was satisfactory in Group II, but was not satisfactory in all the animals of Group I. The duration of anaesthesia was found prolonged in group II dogs (49.11 ± 6.67 min.) than in the group I (39.52 ± 4.96 min.) But the recovery time was found less in group II dogs (68.00±3.89.) than in the group I (76.83 ± 5.26min.). The analgesia score was found more in group II dogs (3.00 ± 0.00) than in the group I (1.45 ± 0.15s). The sedation score was found more in group II dogs (2.90 ± 0.15) than in the group I (1.42 ± 0.10). The total dose of thiopental (in ml) for induction and maintenance was found less in group II dogs (4.51 ± 0.99) than in the group I (8.35 ± 1.23). In group I and group II the eye balls were fixed downward during anaesthesia, and fixed centrally positioned during recovery as well as before premedication. In group I, the corneal, pedal, palpebral and cutaneous reflexes were present after preanaesthetics drug administration. During anaesthesia all reflexes were absent and during recovery all reflexes were present.

In group II, the corneal and palpebral reflexes were moderately depressed after preanaesthetics drug administration. During anaesthesia all reflexes were absent and during recovery all reflexes were present.

Physiological examination revaled that rectal temperature, pulse rate, respiration rate decreased significantly during anaesthesia as compared to different periods of interval in both groups. Also decrease in Hb, PCV, TLC and TEC was recorded during anaesthesia as compared to before premedication in both the groups.

Biochemical examination revaled that ALT, AST, BUN and Serum Creatinine increased significantly during anaesthesia as compared to before premedication in both the groups.

On the basis of observations made during the present study following conclusion were drawn: -

Xylazine with glycopyrrolate-diazepam combination as preanaesthetic medication with thiopental anaesthesia produce adequate sedation, analgesia, smooth induction and good muscle relaxation in dogs.

The depth of anaesthesia without xylazine premedication was not found satisfactory for major surgical procedures. But it was satisfactory in xylazine-premedicated animals.

Xylazine has dose sparing effect on thiopental anaesthesia used for induction and maintenance of anaesthesia in dogs.

These observations suggested that both above anaesthetic combinations can be safely used in dogs but the best result can be achieved when xylazine and glycopyrrolate combination are used as preanaesthetic. There was lack of any post anaesthetic complications.

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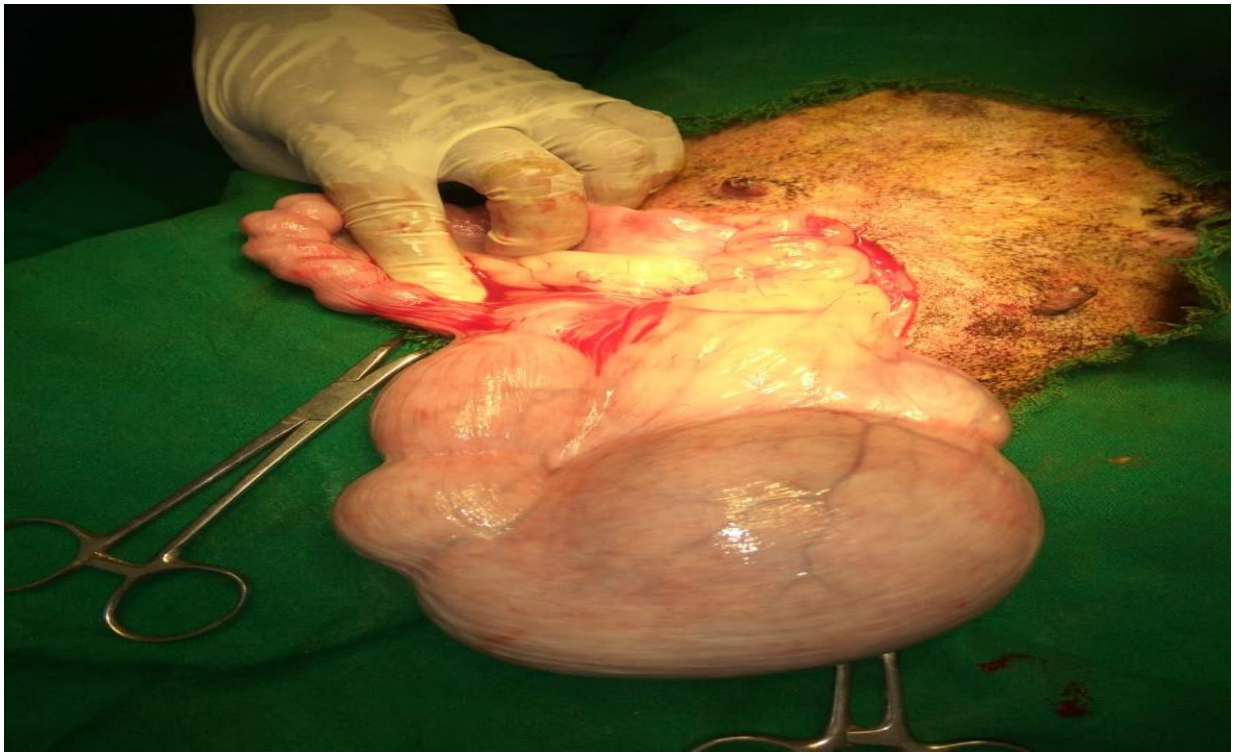

Fig.- Surgical intervention of Pyometra in dog

Fig.-Drugs used in research

ACKNOWLEDGEMENT

I would like to express my deep sense of gratitude and indebtedness to my guide and major advisor, ***Dr. Mithilesh Kumar,*** *Asstt. Prof. cum Jr. Scientist Department of Veterinary Surgery and Radiology, Bihar Veterinary College, Patna, for valuable guidance, keen interest, close supervision, constant encouragement and healthy criticisms during the course of investigation. His painstaking supervision of the manuscript warrants special mention, without which this research undertaking would not have completed.*

I am highly obliged to ***Dr. S.R.P. Sinha, Ex-*** *Chairman, Deptt. of Veterinary Surgery and Radiology, for his useful suggestions and needful facilitation of contrivance during the course of investigation.*

I am also highly obliged to ***Dr. Ramesh Tiwary, Dr. Archana Kumari, Dr. Rajesh Kumar, Dr. G.D.Singh,*** *Asst. Prof., Deptt. of Veterinary Surgery and Radiology, for his co-operative behaviour, valuable suggestions during the research work.*

I am grateful to the other members of my advisory committee, ***Dr. Ranveer Sinha,*** *Assistant Professor-cum Jr. Scientist Department of Veterinary Medicine,* ***Dr. Ajeet Kumar****, Assistant Professor-cum Jr. Scientist Department of Biochemistry,* ***Dr. Deepak Kumar,*** *Assistant Professor-cum Jr. Scientist. Deptt. of pathology., Bihar Patna, for their valuable guidance, constructive suggestions and timely help during the entire period of investigation.*

My sincere thanks are also to all Assistant Professor-cum Jr. Scientist of Bihar Veterinary college, Patna for his co-operative behaviour, valuable suggestions and moral support during the research work.

I acknowledge my thanks to ***Dr. Rameshwar Singh****,* ***Honb'le Vice Chancellor****,* ***BASU****,* ***Dr. Jai Kishan Prasad, Dean*** *Bihar Veterinary college, Patna, for providing the necessary facilities during the tenure of this investigation.*

I, with great pleasure, acknowledge my thanks to ***Dr. Ravindra Kumar,*** *PG Dean cum DRI &* ***Dr. H. M. Saxena,*** *ex-PG Dean, Bihar Animal Science University, Patna-14, for providing the necessary facilities during the tenure of this investigation.*

A deep sense of gratitude is expressed to Bihar Animal Sciences University, Patna, Bihar, for providing facilities to conduct this investigation.

My thanks are also extended to all the respected seniors ***Dr. Kislay Kumar, Dr. Babul Kumar, Dr. Awdhesh Kumar*** *many colleagues like* ***Dr. Arvind Kumar Singh, Dr. Sushil Kumar****, Dr U N Dubey, Dr Chandramani, Dr. Saikh Munna* *and most loving junior* ***Dr. Ritesh Kumar, Dr. Sukhjider, Dr. Sudhanshu Pratap Singh, Dr. Chandan, Dr. Praveen kumar, Dr. Vishnu Prabhakar*** *and* ***all other friends*** *who helped me directly or indirectly during my research work with a company of whom helped me to overcome the stressful moment of investigation and physically help from time to time during the course of study.*

I am also thankful to the Librarian and the staff-members of the library of the Bihar Veterinary College, Patna-14 for rendering their cooperative.

Gratitude alone fails to convey my feelings which cannot be expressed in words for the affectionate care, thought fullness, moral support and encouragement constantly received from all members of my family.

I am particularly grateful to my friend ***Dr. Rinki kumari*** *for her extreme patience, sacrifice and moral support and emotional security rendered to me during the course of this study.*

Last but not the least, I thank God for giving me patience and strength to overcome the difficulties which crossed my way in accomplishment of this endeavour.

Place _____

Date _____ **(SHYAMDEO KUMAR*)***

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