PHYSIOLOGICAL STUDIES IN PROPOFOL AND KETOFOl ANAESTHESIA IN DOGS

P. Thejasree¹, P. Veena², N. Dhanalakshmi and K. Veerabrahmaiah

¹M.V.Sc. Student, ²Professor, Department of Veterinary Surgery & Radiology; College of Veterinary Science; S.V.V.U., Tirupati (A.P).

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Twelve dogs of either sex presented to the college clinic with surgical problems were utilized to study the effect of ketofol and propofol after premedication with atropine sulphate, diazepam and fentanyl. The animals were divided into two groups of six animals each. Ketofol (1:1 on weight basis) combination was given I/V in group-I dogs @ 3 mg/kg of each drug. Propofol 6 mg/kg b.wt. I/V was given in group-II dogs. Rectal temperature, respiratory rate, pulse rate, pulse oximetry values (SpO₂) were recorded before and at 5,10,15,30, 60 minutes and 2 hrs time intervals. Ketofol with atropine, diazepam and fentanyl premedication provided lesser depression of vital signs as compared to propofol.

**Key words:** Anaesthesia, Dogs, Ketofol, Propofol, Pulse oximetric.

The advantages of using both ketamine and propofol in combination (Ketofol) include analgesia, rapid recovery, preservation of airways and maintenance of spontaneous respiration and haemodynamic stability (Saeed, 2011). Atropine, an anticholinergic agent, blocks muscarinic receptors at the postganglionic terminations of cholinergic fibers in the autonomic nervous system (Young et al., 2009). Diazepam, a benzodiazepine, has calming, muscle-relaxant and anticonvulsant effects. It is frequently administered prior to ketamine to prevent seizures and muscle hypertonus (Lumb and Jones, 1996).

There is paucity of literature available on evaluation of propofol and ketofol anaesthesia following atropine, diazepam and fentanyl premedication in dogs. Therefore in the present study, those drugs were evaluated for their safety and efficacy to induce general anaesthesia in dogs.

**Materials and Methods**

Dogs with various surgical problems belong to different breeds, aged between 3 and 6 years and weighing between 8 and 46 kg were utilized for the study. The dogs were randomly selected and routine clinical and haematological examinations were carried out and those were found to be fit for surgery were utilized for the study. Food and water were withheld for 12 hours prior to were withheld for 12 hours prior to administration of the anaesthetic drugs. The dogs were premedicated with atropine sulphate 0.04 mg/kg b.wt. S/C. Ten minutes after premedication, the dogs were administered with diazepam 0.5 mg/kg b.wt. and fentanyl 0.002 mg/ kg b.wt. I/V. After premedication, the animals were divided in to two groups of six animals each as follows.

**Group I:** Dogs were subjected to ketofol (1:1) anaesthesia intravenously. (A combination of ketamine and propofol, each 3 mg/kg b.wt. in a single syringe)

**Group II:** Dogs were given propofol anaesthesia @ 6 mg/kg b.wt.I/V.

Rectal temperature, respiratory rate, pulse rate, pulse oximetry values (SpO₂) were recorded before and at 5,10,15,30, 60 minutes and 2 hrs time intervals of anaesthesia.

**Results and Discussion**

Animals in group I showed a non significant decrease in rectal temperature throughout the period of observation (Table-1), whereas a significant decrease (p ≤ 0.05) in rectal temperature was noticed in group II animals. There was no significant difference between the groups throughout the period of study. However, the fluctuations were within the normal physiological range. The decrease in rectal temperature could be attributed to depression of thermoregulatory centre, reduced basal metabolic rate and muscle activity, depression of peripheral circulation.

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and vasodilation during anaesthesia as also reported by Weaver and Raptopoulos (1990) and Thurmon et al. (1994). Similar findings were reported by Hughes and Nolan (1999) and Yamashita et al. (2004) in dogs with propofol and fentanyl combination. However, in the contrary to it Shekidesf et al. (2012) reported that no significant change in rectal temperature was observed with ketofol anaesthesia in dogs.

### Table 1: Variations in mean ±SE values of different physiological parameters at different time intervals in dogs of both groups

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Groups</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>30</th>
<th>60</th>
<th>2hrs</th>
<th>Overall mean</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Temperature (°F)</td>
<td>Grou p I</td>
<td>102.26</td>
<td>101.61</td>
<td>101.23±0.74a</td>
<td>100.81±0.83a</td>
<td>100.48±0.99a</td>
<td>99.96±1.18a</td>
<td>100.23±0.80a</td>
<td>100.94±0.32a</td>
</tr>
<tr>
<td></td>
<td>Grou p II</td>
<td>101.86</td>
<td>101.35</td>
<td>100.95±0.17ab</td>
<td>100.61±0.19bc</td>
<td>100.21±0.17bc</td>
<td>100.56±0.32bc</td>
<td>100.63±0.20bc</td>
<td>100.88±0.10a</td>
</tr>
<tr>
<td>Respiratory rate (breaths/minute)</td>
<td>Grou p I</td>
<td>33.66±3.36a</td>
<td>32.83±2.68ab</td>
<td>29.00±1.89bc</td>
<td>28.16±2.52bc</td>
<td>26.00±1.73bc</td>
<td>26.66±2.04bc</td>
<td>26.66±1.90bc</td>
<td>29.00±0.94a</td>
</tr>
<tr>
<td></td>
<td>Grou p II</td>
<td>38.66±3.81a</td>
<td>36.50±1.82ab</td>
<td>31.66±0.58bc</td>
<td>30.00±0.71bc</td>
<td>27.66±2.02bc</td>
<td>27.33±2.17bc</td>
<td>27.33±2.17bc</td>
<td>31.02±0.91a</td>
</tr>
<tr>
<td>Pulse rate (beats/minute)</td>
<td>Grou p I</td>
<td>142.50±3.54a</td>
<td>138.83±5.68ab</td>
<td>131.83±5.66ab</td>
<td>125.50±5.58ab</td>
<td>120.00±5.91bc</td>
<td>119.83±6.42bc</td>
<td>119.66±6.39bc</td>
<td>128.30±2.33a</td>
</tr>
<tr>
<td></td>
<td>Grou p II</td>
<td>143.66±3.81a</td>
<td>131.66±8.03ab</td>
<td>125.33±7.42bc</td>
<td>120.00±6.55bc</td>
<td>116.16±6.35bc</td>
<td>116.66±7.16bc</td>
<td>112.00±6.71bc</td>
<td>122.92±3.04a</td>
</tr>
<tr>
<td>Heart rate (beats/minute)</td>
<td>Grou p I</td>
<td>129.00±5.50a</td>
<td>131.83±5.34a</td>
<td>135.16±5.26a</td>
<td>137.33±5.42a</td>
<td>140.50±5.43a</td>
<td>143.83±4.60a</td>
<td>144.16±5.45a</td>
<td>137.40±2.03a</td>
</tr>
<tr>
<td></td>
<td>Grou p II</td>
<td>126.33±9.05a</td>
<td>117.16±4.37bc</td>
<td>111.16±8.46bc</td>
<td>106.83±8.50bc</td>
<td>100.50±7.25bc</td>
<td>91.16±6.38bc</td>
<td>85.66±4.88bc</td>
<td>105.54±3.43b</td>
</tr>
<tr>
<td>SpO2 percentage</td>
<td>Grou p I</td>
<td>97.63±0.25a</td>
<td>96.75±0.19b</td>
<td>96.38±0.19bc</td>
<td>96.03±0.19bc</td>
<td>95.73±0.12ed</td>
<td>95.41±0.09ed</td>
<td>95.43±0.12bc</td>
<td>96.19±0.12a</td>
</tr>
<tr>
<td></td>
<td>Grou p II</td>
<td>98.77±0.07a</td>
<td>97.42±0.16b</td>
<td>96.15±0.11c</td>
<td>95.70±0.12d</td>
<td>95.32±0.11e</td>
<td>95.39±0.08de</td>
<td>95.31±0.10e</td>
<td>96.29±0.19a</td>
</tr>
</tbody>
</table>

Means bearing different superscripts (a,b,c) within a row differ significantly (p<0.05)
Means bearing different superscripts (A,B) within a column differ significantly (p<0.05)
Group- I : Ketofol
Group- II : Propofol

In group I there was a non significant decrease in RR after 10 min. However, the fluctuations were within the normal physiological range. A non significant decrease in respiratory rate was observed in dogs following ketofol anaesthesia, might be due to the respiratory depressant effects of ketamine and /or propofol (Tale-1) as also reported by Cullen and Reynoldson (1997). A similar decrease in respiratory rate during ketofol anaesthesia in dogs was reported by Lerche et al. (2000) and Taboada and Leece (2014).

A significant decrease in respiratory rate was observed in group II dogs following premedication and induction of anaesthesia which persisted up to 2hrs interval. These findings were in accordance with the earlier studies when propofol was used alone or in combination with opioids in dogs as also recorded by Hughes and Nolan (1999). In the present study, transient apnoea was observed immediately after propofol induction in group II animals. Cullen and Reynoldson (1993) also opined that the depression of afferent activity from the carotid body was probably the underlying cause of respiratory depression and transitory apnoea.

In the present study, a non significant decrease in pulse rate was observed in ketofol group (Table-1), whereas; a significant decrease in pulse rate was noticed in dogs subjected to propofol anaesthesia. The administration of propofol is generally associated with decrease in pulse rate. This depression is believed to be a dose-dependent and caused by lowering of sympathetic tone, in addition to direct negative inotropic and...
venodilator effects as also mentioned by Taboada and Leece (2014). However, increase in pulse rate was observed in dogs anaesthetized with propofol and ketamine as also recorded by Taboada and Leece, (2014).

Decrease in SpO2 was seen in animals of both groups throughout the period of observation. This decrease was significant after 10 minutes of drug administration in both groups, which might be due to a certain degree of respiratory depression by the anaesthetics. Similar findings, following administration propofol and ketofol in dogs were reported by Taboada and Leece (2014).

Propofol, (2,6-di-iso propylphenol) is a lipid soluble sedative agent with a little or no amnestic or analgesic potential. It is widely employed emergency department sedation due to the dense sedation provided, rapidity of onset and reliable recovery time with little, if any residual sedation. Potential side effects are hypotension and respiratory depression with hypoxaemia which is dose-related.

Ketamine is a dissociative anaesthetic provides sedation and analgesia. Although a direct myocardial depressant, the clinical effects of ketamine include a rise in blood pressure, and heart rate due to its sympathomimetic action. Ketamine provides profound analgesia and compares favourably to traditional opiates.

Because both agents posses significant advantages and disadvantages, attempts to combine and therefore offset these side effects is an attractive option. A combination of a lower dose of each agent should result in a decreased incidence of unwanted side effects.

It was concluded that the combination of ketamine and propofol (Ketofol) with atropine, diazepam and fentanyl premedication may be used for anaesthesia in dogs.

References