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Biochemical analysis of Romifidine and Romifidine-ketamine combination in dogs

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Abstract

To conduct the study ten clinically affected dogs of either sex weighting 10-15 kg body weight were divided randomly into two groups. Group I received romifidine @ 40µg/kg body weight and group II received romifidine @ 40µg/kg body weight along with ketamine @ 5mg/kg body weight. Gamma glutamyl transpeptidase, alkaline phosphatase, blood urea nitrogen, creatinine and blood glucose increased significantly ($p < 0.05$) in both the groups. Total protein decreased non-significantly ($p > 0.05$) in group I but significant ($p < 0.05$) decrease of total protein was recorded in group II. Based on the observation romifidine @ 40µg/kg body weight along with ketamine @ 5mg/kg body weight could be recommended for clinical procedure.

Keywords: Romifidine, ketamine, biochemical analysis, dog

Introduction

The α_2 -adrenoceptor agonists are widely used in veterinary medicine for their dose-dependent sedation, analgesia and muscle relaxation. The major actions and side effects of these drugs are similar, although there may be differences in depth and duration of action due to their specificity to α_2 receptors. Romifidine is an α_2 -adrenoceptor agonist with similar sedative effects to other members of its pharmacological group (England *et al.*, 1996) [7]. It produces dose dependent analgesia (Figueiredo *et al.*, 2005) [8] and equally efficacious by either intravenous or subcutaneous route (England and Thompson, 1997) [6]. The recovery time is longer in romifidine-ketamine in comparison to xylazine-ketamine combination (Luna *et al.*, 2000) [13].

However perusal of available literature indicates insufficient information of romifidine in dogs. So, the present study was carried out to study the biochemical effects of romifidine and romifidine-ketamine combination in dogs.

Materials and methods:

To conduct the study ten clinically affected mongrel dogs of either sex weighting 10-15 kg were considered. They were prepared by withholding food for 12 hours and water for 6 hours prior to anaesthesia. Further they were divided into two groups consisting five in each group.

They were received anaesthetics as follows:

1. Group I: Romifidine [1] @ 40µg/kg body weight
2. Group II: Romifidine @ 40µg/kg body weight + Ketamine [2] @ 5mg/kg body weight

Following administration of anaesthetics, 2ml venous blood was collected from cephalic vein at 0, 5th, 15th, 30th, 45th, 60th and 90th minutes in commercially available sterile 4ml vacuum blood collection tube (eVactube) [3] containing clot activator. After collection, the blood samples were kept for separation of serum. Serum was separated from each sample by fine rubber pipette in clean and sterile micro centrifuge tube used for analysis of Gamma Glutamyl Transpeptidase (GGT), Alkaline phosphatase, Total protein, Blood urea nitrogen, Creatinine and Glucose.

The data were analysed by using SPSS 16.0 and Graph Pad Prism 7.0.

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¹ Sedivel® 1.0% Injection, Boehringer, Ingelheim Ltd. U.S.

² Jemis Medicave Ltd., Uttarakhand

³ Peerless Biotech Pvt. Ltd., Millenium House, Perungudi, Chennai-600096, India

Result and Discussion

Following administration of romifidine @ 40µg/kg body weight to group I serum gamma glutamyl transpeptidase increased significantly ($p < 0.05$) from 2.38 ± 0.63 to 3.90 ± 0.03 U/L and from 2.95 ± 0.51 to 3.48 ± 0.26 U/L in group II. This increased trend continued till the end of the study in both groups. This increased serum GGT was suggestive of transient cholestasis (Clemon *et al.*, 1998)^[2]. Talukdar (2012)^[18] reported significant increase in GGT level following intramuscular administration of romifidine in elephants. Findings of this study were in agreement with the result of El-Kammar *et al.*, (2014)^[4] with the use of detomidine in donkeys. Significant ($p < 0.05$) rise in alkaline phosphatase level were recorded in the dogs from 3.89 ± 0.14 to 8.48 ± 0.14 K.A. unit in group I and from 4.16 ± 0.88 to 10.73 ± 0.12 K.A. unit in group II. The peak level was observed at 45 minutes of anaesthetics injection and gradually returned towards the baseline. This increased alkaline phosphatase was suggestive of transient cholestasis (Solter *et al.*, 1994)^[16]. Staffey *et al.* (1994)^[17] recorded relative increased alkaline phosphatase following administration of halothane in horses. Non-significant ($p > 0.05$) reduction of total protein was observed from 61.80 ± 0.20 to 55.95 ± 0.10 g/dl in group I. However significant ($p < 0.05$) reduction of total protein from 62.1 ± 0.52 to 55.50 ± 0.15 g/dl in group II was observed. Maximum reduction was observed at 45 minutes in both the groups. This decrease in total protein level might be due to the anaesthetic stress which is associated with increased adrenal activity (Kaneko, 2008)^[10]. Significant reduction of total protein was reported by Jalanka (1990)^[9] following administration of medetomidine and ketamine in blue foxes. On the contrary, Singh (2007)^[15] recorded non-significant increase in plasma total level following administration of xylazine and ketamine in goats. Blood urea nitrogen increased significantly ($p < 0.05$) from 21.98 ± 0.39 to 38.83 ± 0.17 mg/dl in group I and from 20.80 ± 0.45 to 31.86 ± 0.26 mg/dl in group II dogs. Peak value was observed at 45 minutes following injection. This increase value of blood urea nitrogen might be due to the temporary inhibitory effect of the anaesthetic on renal blood flow. These findings were in agreement with the result following administration of detomidine and ketamine (Kilic, 2008)^[11] and xylazine and ketamine (Kinjavdekar *et al.*, 2007)^[12] in goats. However non-significant ($p > 0.05$) reduction of blood urea nitrogen was observed by Singh *et al.* (2010)^[14] with the use of medetomidine and ketamine in calves. Elevated blood urea nitrogen level could be also due to reduced renal perfusion leading to accumulation of blood urea nitrogen in blood. Significantly ($p < 0.05$) increased level of creatinine was observed from 0.70 ± 0.08 to 1.59 ± 0.08 mg/dl in group I and 0.77 ± 0.10 to 1.83 ± 0.24 mg/dl in group II. This might be due to temporary inhibitory effect of drug on the renal blood flow which in turn might have caused increased level of creatinine. Similar findings were reported following administration of detomidine and ketamine in calves (Kilic, 2008)^[11] and medetomidine and ketamine in blue foxes (Jalanka, 1990)^[9]. Singh (2007)^[15] recorded non-significant ($p < 0.05$) increased level of creatinine with the use of xylazine and ketamine in goats. Significant ($p < 0.05$) increase level of blood glucose was observed from 72.40 ± 1.03 to 131 ± 1.10 mg/dl at 90 minutes in group I and from 72.13 ± 0.48 to 115.31 ± 1.84 mg/dl at the end of the study in the dogs of group II. This might be attributed to the inhibition of insulin released by stimulation of α_2 receptors in the pancreatic β -cells (Kinjavdekar *et al.*, 2007)^[12]. Findings of the present

study were in accordance with the report of El-Magharby *et al.* (2005)^[5] in donkey and El Kammar *et al.* (2014)^[4] following the use of romifidine in baladi goats. Similar findings were obtained by Amarpal *et al.* (2002)^[1] with the use of romifidine in goats. Singh *et al.* (2010)^[14] reported non-significant hyperglycaemia following administration of medetomidine and ketamine in calves. The transient increase in glucose level within 30-90 minutes following romifidine administration was a recognised effect of α_2 -adrenoceptor agonist associated with growth hormone stimulation and insulin suppression through direct inhibitory effect of romifidine on β -cells of pancreas (Dollery, 1991)^[3].

Conclusion

After the end of the study it could be concluded that romifidine @ 40µg/kg body weight along with ketamine @ 5mg/kg body weight is better than romifidine @ 40µg/kg body weight in respect of biochemical parameters. Hence this combination can be used for clinical use.

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