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Effects of Medetomidine and Thiopentone Anaesthesia on the Haematological and Some Serum Biochemical Changes in Donkeys (*Equus asinus*) in Maiduguri, Nigeria

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SUMMARY

The effects of combination of medetomidine and thiopentone intravenous (IV) anaesthesia on haematological and some serum biochemical parameters in donkeys was investigated. A total of 5 donkeys, comprising of 3 females and 2 males with mean body weight (159 ± 16.63 kg) and age (3.45 ± 0.50 years) were used for the present study. Each donkey was given a recommended dose of medetomidine at 5µg /kg and 10 % thiopentone at 7mg/kg body weight IV. Pre-anaesthetic blood samples were collected and later at 15minutes interval during anaesthesia in EDTA bottles for haematological and biochemical analysis. The parameters evaluated were packed cell volume (PCV), haemoglobin concentration (Hb), red blood cells (RBC), white blood cells (WBC), and differential leucocytes (neutrophils, eosinophils, basophils, lymphocytes and monocytes) as well as serum biochemical parameters of alanine amino transferase (ALT), aspartate transaminase (AST), blood urea nitrogen (BUN) and Creatinine (Crea). The medetomidine-Thiopentone combination produced no significant difference (P>0.05) in all the haematological and serum biochemical parameters measured.

Key words: Haematological, Thiopentone, Medetomidine, Biochemical parameters, Donkeys.

INTRODUCTION

The donkey (*Equus asinus*) has been associated with mankind throughout recorded history. It is still widely used in many parts of the world for carrying of all kinds of goods and also as a means of transportation. (Fielding,1991). Donkeys are desert-adapted animals, that survive where horses cannot. Their survival is due to the ability to rehydrate quickly when water is presented, greater variability in

thermoregulation to reduce stress from variation in ambient temperature, willingness to eat feeds unpalatable to horses and differences in susceptibility to diseases highly fatal to horses (Fadia *et al.*,2003; Gul *et al.*,2007). Donkeys are behaviourally and physiologically different from horses. However, in order to get an accurate preoperative evaluation of a donkey. it is important to recognize some of the differences, from horses, which may have impact on anaesthetic management (Fadia *et al.*,2003). Sedatives and premedications used in other equine species such as horses have been used in donkeys and mules with relatively good results (Zamur *et al.*, 2011). Although, in general consideration donkeys require 50 % less drugs than mules or horses to achieve sedation (Ayad *et al.*,2012). In some instances, the standing procedures can be accomplished with any of the drugs or their combinations. An ideal surgical anaesthesia is a state of central nervous system depression, characterize by the loss of all sensations and consciousness. It is required for humane surgical procedures and efficacy of surgery (De Moor,2010) Medetomidine HCl, an alpha-2 adrenoceptor agonist is a potent sedative- analgesic (Savola *et al.*,1986; Akbar *et al.,* 2014). It produces reliable degree of sedation, muscle relaxation and analgesia in different animal species (Weinbroum and Abraham,2001; Ripamonti *et al.*,2001). Major side effects include muscle turgidity, fluctuation in hearts functionality and very narrow safety margin (Hellebrekers *et al.*,1998). Decrease in body temperatures is a salient feature of medetomidine (Pyendop and Verstegen,1994). Premedication using sedatives and/or analgesics has been known to improve the quality of general anaesthesia and reduce the amount of anaesthetic drugs required to produce adequate anaesthesia (Adams and Fessler,2000; Hall *et al.,* 2001; McKelvey *et al.,* 2003; Doherty and Valverde, 2006; Tranquilli *et al.,* 2007; Rueangareerat *et al.,* 2013). The use of medetomidine HCl and Thiopentone combination as anaesthetic in donkeys is not well documented and has not been well evaluated in the study area. This study reports the effects of Medetomidine and Thiopentone anaesthesia on the Haematological as well as some serum biochemical parameters in Donkeys (*Equus asinus*) in Maiduguri, Nigeria.

MATERIALS AND METHODS

Animals

Five clinically healthy Donkeys comprising of (3 Females and 2 Males) with a mean ± SD body weight of 159 ± 16.63 kg, and age 3.45 ± 0.50 years were used for the study. The animals were procured from Maiduguri livestock market in Borno state, Nigeria. The animals were kept at the Large animal clinic (LAC) unit of the Veterinary Teaching Hospital. The donkeys were fed with Wheat offals, groundnut husk, grasses and water was provided *ad libitum*. They were dewormed using albendazole at 50mg/kg to reduce parasitic impact on their health and allowed to acclimatize for a period of one month before the commencement of the experiment. Food but not water was withheld from the donkeys for 12 hours before anesthesia.

Anaesthesia

Drugs used in the study were medetomidine (Domitor®) Pfizer,UK) at 5 µg/ Kg (conc. 1mg/ml) and 10%thiopental sodium (U Pental Warenhandels GmbH,Hamburg-Germany) at 7mg/ Kg. Animals were premedicated with medetomidine using 18-gauge needle placed in the jugular vein. Five minutes later anaesthesia was induced with 10%thiopental sodium and as the animal became recumbent, a drip infusion line was instituted via the jugular vein and fluid therapy commenced with 5% dextrose saline (Juhel ®**,** Fabrique par juhel Nig.Ltd., Awka, Anambra,Nigeria) as maintenance fluid set at 1ml per 10 Kg body weight per minute. Attached to the drip infusion set was a threeway stopper for ease of blood

collection. Thereafter blood was collected at 15minutes interval during anaesthesia and at 1hour post anaesthesia.

Haematological analysis

Blood samples (5mls) each were collected from jugular vein from all the five donkeys to establish a baseline data before the commencement of treatments. Blood samples were collected in sample bottles containing EDTA and analysis was conducted immediately after collection. The packed cell volume (PCV%) and haemoglobin (Hb) were determined using micro- haematocrit method as described by Coles (1986). The red blood cell (RBC) and white blood cells (WBC) counts were determined using the hemocytometer method according to Coles (1986). The percentage of individual white blood cells (differentials white blood cell counts) were determined on Leishmans stained slides using a microscope at X 100 magnification using meander method described by Coles (1986).

Data analysis

All data generated were expressed as mean ± standard deviation (SD). The mean PCV, WBC, Hb, differential leucocytes count and ALT, AST, BUN and Crea were subjected to One way repeated measures ANOVA with a Dunnetts Multiple Comparison Post Test using GraphPad Prism version 4.0. Values of ($P<0.05$) were considered significant.

RESULTS

Table 1 shows the results of the haematological parameters of donkey given medetomidine and thiopentone anaesthesia at different time interval. The values of PCV insignificantly reduces over the increase of time while Hb initially reduce at 15 and 45 minutes during anaesthesia but increase at 1hour post anaesthesia, although the values were not significantly different ($P>0.05$). Moreover, the values of RBC insignificantly reduce ($P>0.05$) during and post anaesthesia. However, WBC reduces at 15 minutes during anaesthesia and 1hour post anaesthesia, but increases at 45 minutes during anaesthesia. The DLC values were not significantly different ($P>0.05$).

Table II shows the result of serum biochemical parameters of donkey given medetomidine and thiopentone anaesthesia at different time interval.The values of ALT increases insignificantly at 1 hour post anaesthesia while the value of AST decrease at 15 minutes and slightly rise at 30 minutes and 45 minutes during anaesthesia and at 1 hour post anaesthesia .Although the values were not significantly different ($P>0.05$). Moreover BUN decreased at 15 minutes during anaesthesia,but rose at 30 minutes and 45 minutes during anaesthesia and at 1 hour post anaesthesia.The values were not significantly different ($P>0.05$).

However, creatinine values increase at 15 minutes and 45 minutes during anaesthesia but decreased 1-hour post anaesthesia as all values were not significantly different ($P>0.05$).

DISCUSSION

The effect of medetomidine HCl and thiopentone combination as anaesthetic was assessed on the basis of haematological and serum biochemical changes in donkeys under experimental conditions. The PCV, Hb and RBC showed no significant difference ($P >0.05$) throughout the period of anaesthesia. Although, a slight decrease in PCV and Hb was observed during the period of anaesthesia, this may be due to shifting of body fluid from extravascular to intravascular compartment to maintain normal cardiac output (Wagner *et al.*, 1991). However, in horses, Gasthuys *et al.* (1987) reported increased PCV 30 minutes after administration of medetomidine HCl. This difference may be associated with combination anaesthesia used in the current study since the previous study used only medetomidine

TABLE I: Haematological parameters of donkeys (*Equus asinus*) given medetomidine (5µg/kg) and thiopentone (7mg/kg) anaesthesia in Maiduguri, Nigeria

PARAMETERS	Baseline	15Mins	30Mins	45Mins	1hrPA
PCV(%)	29.0±4.95	25.4±5.08	23.4±4.93	24.2±4.87	28.0±7.14
Hb(g/dl)	8.98±0.52	8.48±0.58	8.48±1.00	8.44±1.11	8.92±0.81
RBC($\times10^6$µl)	5.82±1.44	5.56±1.39	5.30±1.38	5.33±1.44	5.78±1.56
WBC($\times10^3$µl)	10.02±0.69	9.86±0.67	9.88±0.96	9.7±0.77	9.88±1.41
NEUT($\times10^3$µl)	5.07±0.76	4.84±0.63	4.86±0.77	4.79±0.84	4.99±1.24
LYMPHO($\times10^3$)	3.45±0.46	3.70±0.53	3.73±0.70	3.56±0.68	3.48±0.63
MONO($\times10^3$µl)	0.65±0.18	0.60±0.16	0.47±0.28	0.53±0.16	0.69±0.09
EOSINO($\times10^3$µl)	0.84±0.19	0.69±0.21	0.80±0.18	0.78±0.27	0.72±0.26
BASO($\times10^3$µl)	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00

There was no significant difference (P>0.05) between values within rows

TABLE II: Serum biochemical parameters of donkeys (*Equus asinus*) given medetomidine (5µg/kg) and thiopentone (7mg/kg) anaesthesia in Maiduguri, Nigeria

PARAMETERS	BASELINE	15 MINS	30 MINS	45 MINS	1 hr P.A
ALT (µ/l)	4.00 ±0.00	4.00 ±0.00	4.00 ±0.00	4.00 ±0.00	4.80 ±1.79
AST (µ/l)	6.00 ±2.83	6.00 ±2.83	6.00 ±2.83	6.00 ±2.83	16.20 ± 5.07
BUN (µmol/l)	4.80 ±1.79	4.80 ±1.79	4.80 ±1.79	4.80 ±1.79	7.54 ± 3.36
CREA (Mmol/L)	87.00 ± 16.05	94.60 ± 28.03	88.80 ± 12.33	102.20 ± 25.59	76.80±25.78

There was no significant difference (p>0.05) between values within rows

Since the values of PCV, Hb and RBC serve as reliable indicators of the oxygen carrying capacity of blood and subsequent tissue perfusion, the results obtained denotes absence of anaemia (there was blood collection at different intervals and proper tissue perfusion during anaesthesia. Our results further revealed that combined medetomidine-thiopentone anaesthesia has no significant effects on the PCV, Hb, RBC, WBC and DLC counts of donkeys. The mean values of ALT and AST recorded during anaesthesia were within normal range of values previously reported (Egbe- Nwiyi *et al*., 2000). Similarly, the mean value of BUN recorded during anaesthesia also compares with previous report by Lemma and Moges, (2009). The baseline values of CREA obtained in this study were similar to one found by (Seri *et al.,* 2010). These findings suggest that the combination medetomidine-thiopentone anaesthesia is well tolerated in donkeys, since there is normal kidney and hepatic functions. This finding signifies the safety of combining the two agents to produce anaesthesia in donkeys.

There are no significant variations recorded in all the biochemical parameters measured, this indicates that these drugs are well tolerated by the donkey and with no adverse effect on the liver and kidney functions.

Conclusion

This study has shown that medetomidine-thiopentone anaesthesia produced no significant effects on the PCV, Hb, RBC, WBC, DLC and some serum chemistry values of apparently healthy donkeys.

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