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USE OF PENTOBARBITAL FOR INDUCING STANDING SEDATION IN BUFFALOES (With 3 Figs.)

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استخدام البنتوباربيتال في تهدئة الجاموس

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أستخدم البنتوباربيتال بجرعات (٢ - ٢.٥ - ٣ ملي جرام/كجم من وزن الحيوان بحقنة في الوريد في الجاموس لدراسة أنسب جرعة لتهدئته وكذلك تأثيره على وظائف الدورة الدموية والتنفسية وحركة الكرش وغازات الدم وقد تم دراسة التأثير بعد ١٥ ، ٣٠ ، ٦٠ ، ٩٠ دقيقة بعد الحقن بالوريد. وأوضحت الدراسة أن جرعتي ٢ - ٢.٥ مليجرام/كجم أعطيت تهدئة قليلة في زمني ١٥ ، ٣٠ دقيقة ولم تحدث أي تهدئة في زمني ٦٠ ، ٩٠ دقيقة. أما بالنسبة لجرعة ٣ ملي جرام/كجم فقد أعطت تهدئة متوسطة في زمني ١٥ ، ٣٠ دقيقة وتهدئة قليلة في زمن ٦٠ دقيقة ولم تحدث أي تهدئة في زمن ٩٠ دقيقة. كما تم دراسة تأثير إعطاء ٣ ملي جرام/كجم من المركب على معدلات التنفس والنهش وحركة الكرش وغازات الدم.

SUMMARY

Pentobarbital (2.0, 2.5 and 3.0 mg/kg, B.Wt. intravenously) was administered to four adult buffaloes to determine a dose suitable for producing standing sedation in adult buffaloes, and to evaluate its effects on cardiopulmonary function and rumen motility. The response was assessed after 15, 30, 60 and 90 minutes. The 2.0 and 2.5 mg/kg dose induced mild sedation at 15 and 30 minutes, and no sedation at 60 and 90 minutes. The 3.0 mg/kg dose produced moderate sedation at 15 and 30 minutes, mild sedation at 60 minutes and no sedation at 90 minutes.

The 3.0 mg/kg dose was judged to be the most suitable. The effects of pentobarbital (3.0 mg/kg I.V) on heart rate, respiratory rate, blood gases and rumen motility were measured in five buffaloes during a 90 minute period. Pentobarbital at a dose of 3.0 mg/kg did not produce significant changes in heart rate, blood gases, ruminal contraction and Respiratory rate at 15, 30 and 60 minutes. Pentobarbital (3.0 mg/kg IV) is reliable in adult buffaloes for standing sedation of short duration.

INTRODUCTION

Sedation is defined as a state of mild central depression during which the patient is awake but calm (LUMB and JONES, 1984). Commonly used sedatives in cattle include xylazine Hcl, phenothiazine derivatives and chloral hydrate. They may be used alone or in combination with local anesthetics for standing surgical procedures or before general anesthesia with inhalation agents.

Xylazine Hcl is the most widely used drug for chemical restraint in the bovine species. It provides good sedation and analgesia, but may produce undesirable side effects. Bradycardia and decreased cardiac output occur at clinical dos rates (CAMPBELL, *et al.* 1979). Xylazine produces a fall in arterial oxygen tension (Pa O₂) even in the standing animal that is apparently the result of a ventilation / perfusion mismatch (MITCHELL and WILLIAMS, 1979 and DOHERTY, *et al.* 1987). Pronounced salivation develops through its effects on the parasympathetic nervous system and ruminal atony, bloating and decreased appetite are common (KNIGHT, 1980). Because xylazine increases uterine tone it may be contraindicated in the last trimester of pregnancy in cattle (KNIGHT, 1980; LeBLANC, *et al.* 1982 and LeBLANC, *et al.* 1984).

Chloral hydrate, in a dose that induces sedation, has little effect on cardiopulmonary variables (TRIM, 1981). However, the irritant effects on perivascular tissues from infusing large volumes intravenously have limited its use. The phenothiazine derivatives include promazine, acepromazine and chlorpromazine. These tranquilizers induce varying degrees of sedation and can cause hypotension and relaxation of the musculature of the esophagus and cardia predisposing to regurgitation (JONES, 1972 and HALL, 1983).

pentobarbital is classified as a short-acting barbiturate with sedative- hypnotic effects ranging from mild depression and muscle relaxation to unconsciousness, depending on the dose used (SHORT, 1987). MUIR (1981) reported that 0.5 to 1.1 mg/kg (I.V) produced sedation in horse. VALVERDE, *et al.* (1989) stated that pentobarbital (2.0 mg/kg I.V) is reliable in adult Holstein cows for standing sedation of short duration.

The purpose of this study is to determine a suitable dose of thiopental for inducing stand sedation in buffaloes, and to determine any associated cardiopulmonary changes.

MATERIAL and METHODS

Four buffaloes weighing 320 to 460 kg, were used in this study. The study was designed in the form of a Latin squar with each animal being used in four

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occasions at weekly intervals. The degree of ataxia was assessed by clinical signs using a scale 0 to 3, with 0 indicating absence of ataxia; 1, knuckling of the fetlocks; 2, crossing of the hindlimbs and 3, attempting or assuming recumbency. The degree of sedation was also assessed using a scale from 0 to 3, with 0 indicating no obvious sedation; 1, (mild) drooping of the eyelids; 2, (moderate) lowering the head, minimum to moderate reaction to noise nociception and handling and 3 (deep) no reaction to noise nociception and handling.

Pentobarbital at one of the test doses (2.0, 2.5 or 3.0 mg/kg B.Wt) or 20 ml of physiological saline was infused intravenously over a 1 minute period, and the responses were monitored 15, 30, 60 and 90 minutes later.

Pentobarbital (3.0 mg/kg B.Wt) was infused intraveonously in five adult buffaloes (weighing 375 to 450 Kg). From each animal two milliliter of blood were collected by means of vien puncture into syring whose dead space had previously filled with sodium heparin solution (1:1000 i.u/ml). Carbon dioxide tension (P_{CO_2} - mm hg) and oxygen tension (PO_2 -mmHg) were estimated using blood gas - analyzer model 168.

Cardio pulmonary functions including heart rate; respiratory rate and ruminal contraction were estimated at 0, 15, 30, 60 and 90 minutes intervals.

RESULTS

The degree of ataxia and sedation produced by each of the doses of pentobarbital are represented in graphic figures (1 & 2). The onset of ataxia and sedation was evident immediately.

Pentobarbital at a dose of 3.0 mg/kg produced the highest degree of ataxia and sedation.

The group values for cardiopulmonary variables are present in Fig. (3). Intravenous injection of 3.0 mg/kg B.wt. of pentobarbital did not produce significant changes in heart rate, blood gases (oxygen tension and carbon dioxide tension), ruminal contractions and respiratory rate. Cardiopulmonary Variables are noticed at 15, 30, 60 and 90 minutes intervals.

DISCUSSION

Pentobarbital is usually used in high doses for anesthesia. It may, however, be used as a sedative and premedicament (SHORT, 1987). The results of this study indicated that the tested doses of pentobarbital (2.0, 2.5 and 3.0 mg/kg) produced

good standing sedation in buffaloes. The 3.0 mg/kg dose was judged to be the most suitable in terms of degree and duration of sedation and although the degree of ataxia was higher, all buffaloes remained standing.

Subanesthetic doses of barbiturates induced hyperalgesic state in mice (NEAL, 1965 and HORI, et al. 1984). In contrast subanaesthetic dose of pentobarbital do not produce hyper algesic state in cat (SANDKUHLER, et al. 1987). Further studies are needed to resolve this inconsistency. However, hyperalgesic state was not observed in buffaloes sedated with pentobarbital.

Anesthetic dose of pentobarbital eliminate resting vagal tone so produce an increase in heart rate NEAL (1965) and MURTHY, et al. (1982). On the contrary, the heart rate in the present study showed nonsignificant variations which can be attributed to subanesthetic doses which produced a sympathetic- parasympathetic balance.

Blood gases (P_{CO_2} & P_{O_2}) remained unchanged inspite of a nonsignificant decrease in respiratory rate. This is indicating that an increase in tidal volume occurred. This lack of respiratory depression indicates an advantage of pentobarbital over xylazine which coincided with those previously obtained by MITCHELL and WILLIAMS (1979) and DOHERTY, et al. (1987).

The ruminal contraction rate remained unchanged and tympany did not occur despite the fact that buffaloes were not fasted. Atony, loss of appetite and or diarrhoea were not noticed during the following 24 hours.

The results of this study indicated that the tested doses of pentobarbital (3.0 mg/kg IV) is reliable in adult buffaloes for standing sedation of short duration.

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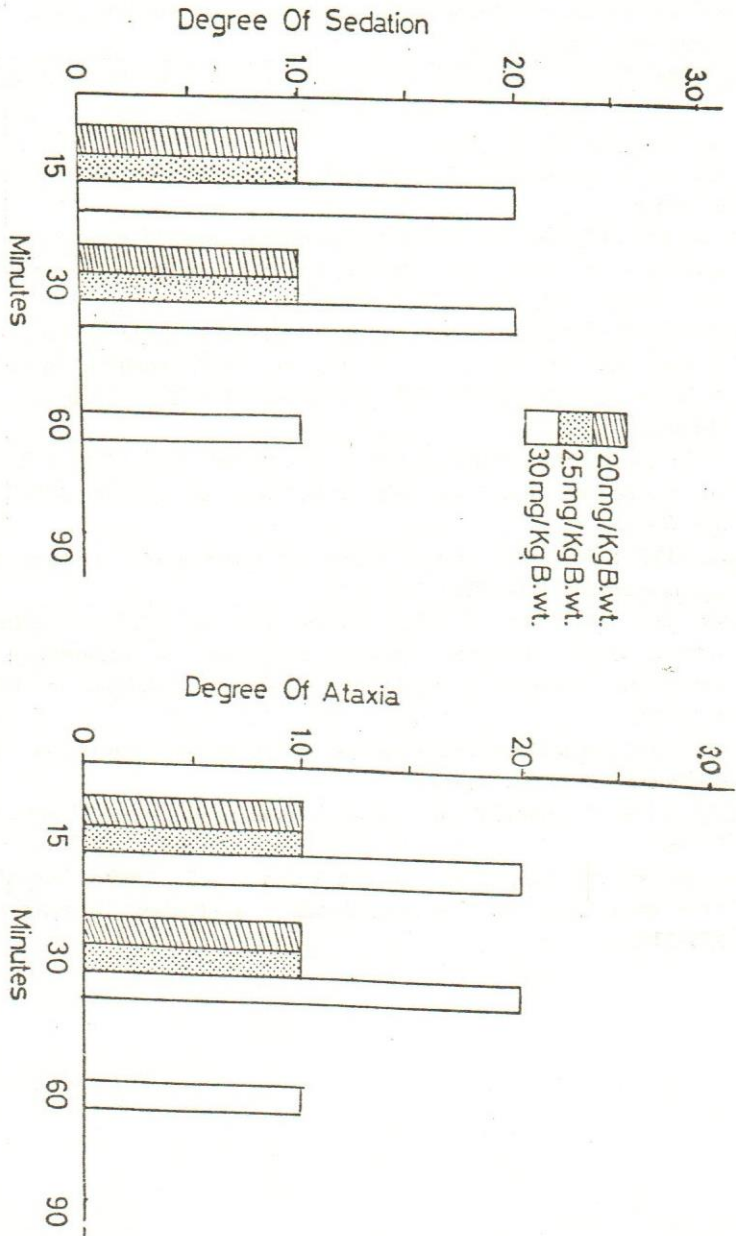


Fig. (1): Degree of sedation induced by pentobarbital (2.0, 2.5 and 3.0 mg/kg. B.Wt. I.V) in buffaloes. Responses are evaluated on scale from 0 to 3.

Fig. (2): Degree of Ataxia induced by Pentobarbital (2, 0, 2.5 and 3.0 mg/kg. B.Wt. IV) in buffaloes. Responses are evaluated on scale from 0 to 3.

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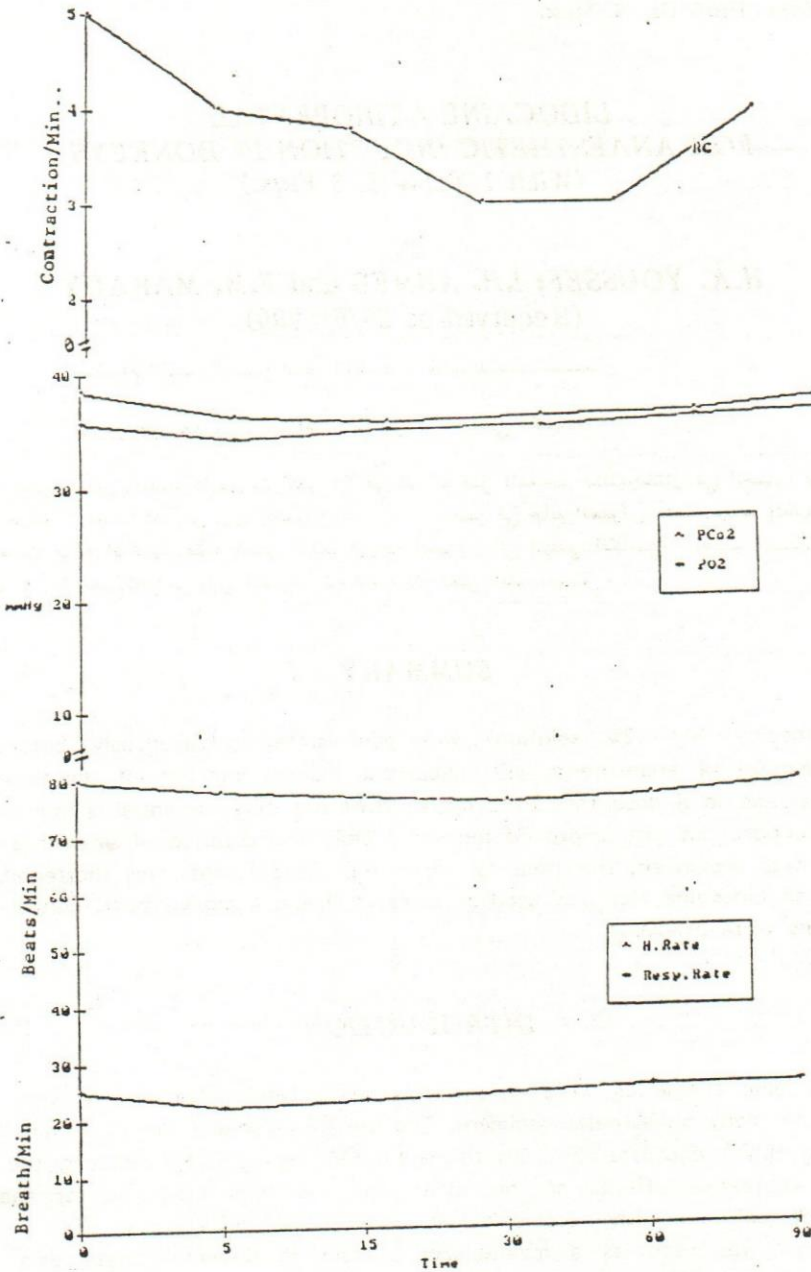


Fig. (3): Mean heart rate (H.rate); respiratory rate (Resp. rate) Carbon dioxide tension (PCO₂); oxygen tension (PO₂) and raminal contraction (RC). Time 0 represent baseline Values.