

قسم : الجراحة

كلية الطب البيطري - جامعة أسيوط

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فازات الدم والاتزان الحامضي القاعدي

تحت تأثير الرمبون في الأغنام

محمد عادل ، أحمد صالح ، علي السباعي ، هارون يوسف

استخدم في هذه الدراسة عدد (٩) أغنام من الذكور والاناث قسمت الى ثلاث

مجموعات

حقنت بالرمبون بجرعات ٣، ٦، ١٠ مليجرام لكل كيلو من وزن الجسم على التوالي .
وقد سجلت درجات الحرارة ومعدلات النبض والتنفس قبل وبعد الحقن وكذلك الاعراض
الأكلينيكية .

لوحظت أنه هناك درجات متفاوتة من قلوية الدم بعد حقن الرمبون للأغنام
وقد كانت قلوية الدم في أعلى درجاتها في المجموعة التي حقنت رمبون ١٠ ملجم /
كيلوجرام من وزن الجسم بينما ظهرت أسرع في المجموعة الثالثة التي حقنت رمبون
١ ملجم / كيلوجرام من وزن الجسم بالإضافة الى أن استخدام الرمبون في هذه الجرعة
أعطى نتائج جيدة بالنسبة لهدف تسكين الألم وكذلك تخدير الحيوانات بدون
أي أعراض تسمم .

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ACID-BASE BALANCE AND BLOOD GASES ALTERATIONS UNDER THE EFFECT OF ROMPUN IN SHEEP

(With 4 Tables and One Figure)

By

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SUMMARY

Nine sheep of both sexes were used in this investigation. The animals were classified into 3 groups (each of 3 animals). Doses of Rompun injection were 0.3, 0.6, 1.0 mg/Kg body weight respectively. Temperature, pulse and respiration rates before and after Rompun injection were recorded. Clinical signs were also demonstrated. The animals of all groups showed a different degree of alkalosis. Severe alkalosis was noticed in animals given Rompun in a dose of 0.6 mg/Kg body weight, while rapid appearance of alkalosis in animals received Rompun in dose of 1.0 mg/Kg body weight. Animals in group 3 in addition showed good analgesia and anaesthesia without any symptoms of toxication.

INTRODUCTION

ROMPUN is widely used in veterinary practice as a sedative, analgetic, anaesthetic and muscle relaxant, in addition to its common use for tranquilization of animals. Despite the recommended application of rompun in large animals, it is of less common use in small animal practice (BAFIYEBOE and HUVES, 1980). The available literature on the use of rompun in sheep are very scanty (STRAUB, 1971).

Regarding the dose of rompun, STRAUB (1971) and SHOKRY *et al.* (1976) reported that the optimal dose for clinical examination and performing different surgical interference is 0.3 mg/Kg body weight. Moreover, BAUDITZ (1972) studied the metabolism and elimination of rompun in the body. The author recorded that after i.m. injection in dose of 1.0 mg/Kg body weight, only 1/3 of the dose was present in the area of injection, while after 10 minutes to 20 hours the contents were reduced to few microgrammes. SAGNER *et al.* (1968) and KOSUCH (1973) stated that a dose of 0.1-0.6 mg/Kg body weight was applied in partially painful operations without any symptoms of toxication.

TEVIK *et al.* (1968) stated a marked decrease in blood pH with marked elevation in value of carbon dioxide tension under the influence of general anaesthesia with chloroform and halothan. Respiratory acidosis can develop during anaesthesia with chloral hydrate, combelen and thiopental (FRITSCH, 1965). On the other hand SAMY *et al.* (1986) reported that anaesthesia with chloral hydrate and combelen in donkeys causes a marked drop in the blood pH values after one hour of the onset of the anaesthesia, accompanied by initial increase in respiratory rate that was followed by decrease in respiratory rate.

The effect of rompun on acid-base balance and blood gases is however not sufficiently studied. It is aimed therefore to study the extent of changes in acid-base balance and blood gases in addition to scoring the clinical signs under the influences of rompun administration in sheep.

M.A. ALI, *et al.***MATERIAL and METHODS**

The study was carried out on nine clinically healthy native breed sheep of both sexes. Age of animals ranged from 2-4 years and between 30-60 Kg body weight.

Animals were divided into 3 groups (each of 3 animals) and injected with rompun (2% solution) i.m. in a dose of 0.3, 0.6 and 1.0 mg/Kg body weight respectively.

Pulse, respiration, temperature, reflexes and other clinical informations were registered at 0, 15, 30, 60, 90, 120 and 150 minutes post-injection of rompun.

Venous blood samples were collected from animals anaerobically into a syringe whose dead space had been previously filled with 1:1000 heparine (sodium). These samples were immediately placed on ice-bath and measured within 45 minutes of collection. Blood gases measurements were performed using Corning-pH blood gas analyzer model 168. The analyzer directly measured at 37°C, blood pH, carbon dioxide tension ($p\text{CO}_2$: mm Hg) and oxygen tension ($p\text{O}_2$: mm Hg). Bicarbonate (HCO_3^- : mmol/l), total carbon dioxide (TCO_2 : mmol/l) and base excess (B.E.: mmol/l) were calculated automatically by the same apparatus.

RESULTS**Clinical Observation and Reflexes :**

Group I (0.3 mg/Kg body weight rompun): A distinct sedation and a certain relief of pain sensation was observed after 12 minutes. The effect was increased and clearly noticed after 15 minutes. At this period there was salivation, sinking of the head and neck and un-awareness of the surrounding. All animals remained standing. The effect of rompun gradually disappeared after 30-60 minutes.

Group II (0.6 mg/Kg body weight rompun): Analgesia and sedation were pronounced after 8-10 minutes post-injection. In this stage, lowering of head and neck, muscular incoordination and staggering gait were noticed. All animals lay down with head and neck laterally turned backwards as in milk fever position. Twenty minutes post-injection, pronounced salivation and frequent urination were observed. These clinical manifestation remained for 60-90 minutes after injection.

Group III (1.0 mg/Kg body weight rompun): The symptoms of sedation and analgesia were started in 5-7 minutes after injection. Partial drooping of the upper eyelid was evident and corneal reflex was delayed. Protrusion of the nictitating membrane was noticed. Salivation was watery and more profuse. Lowering of the lower lip and partial or complete paralysis of the tongue were observed. The skin and interdigital reflexes were absent. Frequent urination was also noticed.

The mean values of respiratory rate, pulse rate and body temperature were illustrated in table (1).

Alterations in Values of Acid-Base Balance and Blood Gases :

Mean values of blood pH, $p\text{CO}_2$, HCO_3^- , TCO_2 and base-excess for different groups were illustrated in tables 2,3 and 4. Also blood pH and base-excess were illustrated in Fig. (1).

Group I, mean value for zero-time were 7.370, 42.0 mm Hg, 35.7 mm Hg, 24.2 mmol/l, 25.4 mmol/l and 0.6 mmol/l respectively. Maximum elevations of the mean values were observed

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at 60 minutes post-injection (7.457, 43.2 mm Hg, 36.9 mm Hg, 33.2 mmol/l, 31.1 mmol/l and 6.1 mmol/l respectively).

Group II, mean values for zero-time were 7.418, 37.1 mm Hg, 28.1 mm Hg, 24.0 mmol/l, 25.0 mmol/l and 0.5 mmol/l respectively. The reading of such parameters at 90 minutes post-injection were 7.496, 38.5 mm Hg, 37.5 mm Hg, 29.6 mmol/l, 30.7 mmol/l and 7.0 mmol/l.

Group III, the pre-administration mean values were 7.372, 43.6 mm Hg, 33.4 mm Hg, 25.2 mmol/l, 26.5 mmol/l and 0.2 mmol/l respectively. The highest mean values were 7.485, 39.0 mm Hg, 42.5 mm Hg, 29.2 mmol/l, 30.4 mmol/l and 6.4 mmol/l obtained 120 minutes post-injection.

DISCUSSION

The constant finding after administration of rompun in different doses were, polypnae (39/minute) with marked increase in depth of respiration (60 minutes post administration). In group I the respiratory rate reached its maximum values 60 minutes after rompun administration, while the values in group III were most significantly influenced and reached its maximal values (55/minute) after 30 minute. Furthermore the respiratory rate in all groups decreased again and retained their normal initial values at the end of experiment. Similar results were reported by SAGNER *et al.* (1968) and MOHAMMED *et al.* (1976).

On the other hand, a decrease in pulse rate after administration of rompun behaved more pronounced in group III due to a higher dosage, but there was no clinical influences neither with low doses nor with high dose. The drop in pulse rate may explain the initial rise in respiration as a compensatory mechanism for existing hypoventilation.

A slight effect of rompun was observed on body temperature in which it was irregularly increased and decreased within the normal level.

The other clinical manifestation proved the efficiency of rompun (Bayer) as analgetic and anaesthetic drug in sheep. Major surgical operations as amputation of the digit, ruminal cannulation and castration can be made under the effect of rompun in a dose of 1.0 mg/Kg body weight without any toxic side effects or deaths (KOSUCH, 1973).

The other groups which received 0.3 and 0.6 mg/Kg body weight proved to be sufficient for abolishing pain during clinical examination or during minor surgical operation. However, there was no evidence of excitement or pain response at any time during the whole experiments (SAGNER *et al.*, 1968).

In the present study the mean values of acid-base balance and blood gases before administration of rompun in different groups were within the values previously reported by ENGLISH *et al.* (1969) and EL-SEBAIE and ALI (1986).

The effect of rompun on acid-base and blood gases were evident in group (1) where a marked but gradual increase in pH values was clear and reached its maximal value (7.469) at 90 minutes post-administration. Moreover the oxygen tension was also elevated (46.1 mm Hg) and HCO₃ mean values were increased (33.2 mmol) and consequently the mean values of base-excess were increased to 6.1 mmol/l).

In group II, the alterations in acid-base balance and blood gases values were rapidly observed and the elevation was more pronounced at 120 minutes post-injection (pH: 7.479, pO₂:46.6 mm Hg, HCO₃: 31.6 mmol/l and B.E.: 8.1 mmol/l).

The most obvious changes were observed after the administration of rompun in a dose of 1.0 mg/Kg body weight (group III). The mean values of blood pH, pO₂, HCO₃ and base-excess at 120 minutes post-administration were 7.485, 42.5 mm Hg, 29.2 mmol/l and 6.4

mmol/l respectively.

It could be concluded that animals of all groups under the influence of rompun administration showed a different degree of alkalosis. In such cases alkalosis was associated with polypnae and increase in the depth of respiration. It is well known that an increase in respiratory rate is usually accompanied by an increase in the rate of carbon dioxide elimination from the lungs, and consequently increased lung ventilation and oxygen tension in the blood.

Carbon dioxide tension in all groups was not markedly changed, the decision that a patient has developed alkalosis cannot be based on the blood pCO₂ or pO₂ values alone. Blood CO₂ concentration can be either high or low in alkalosis. Such observations on blood gases and acid-base balance were in agreement with GATES *et al.* (1971).

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Table (1): The mean values of respiration, pulse and temperature under the effect of different doses of rompun.

Time	respiratory rate			pulse rate			temperature		
	Group			Group			Group		
	I	II	III	I	II	III	I	II	III
0	32	31	29	89	73	96	40.0	39.6	39.0
15	34	31	48	83	80	79	39.7	39.4	39.7
30	37	25	55	88	69	71	39.7	38.5	39.2
60	39	25	43	87	73	71	40.0	38.6	38.7
90	33	23	33	85	69	72	40.0	38.6	39.0
120	32	23	31	92	77	79	40.1	38.4	38.6
150	32	24	29	92	83	89	40.0	39.0	38.8

Table (2): Mean values of blood gases and acid-base balance under the effect of 0.3 mg/Kg body weight rompun (Group I).

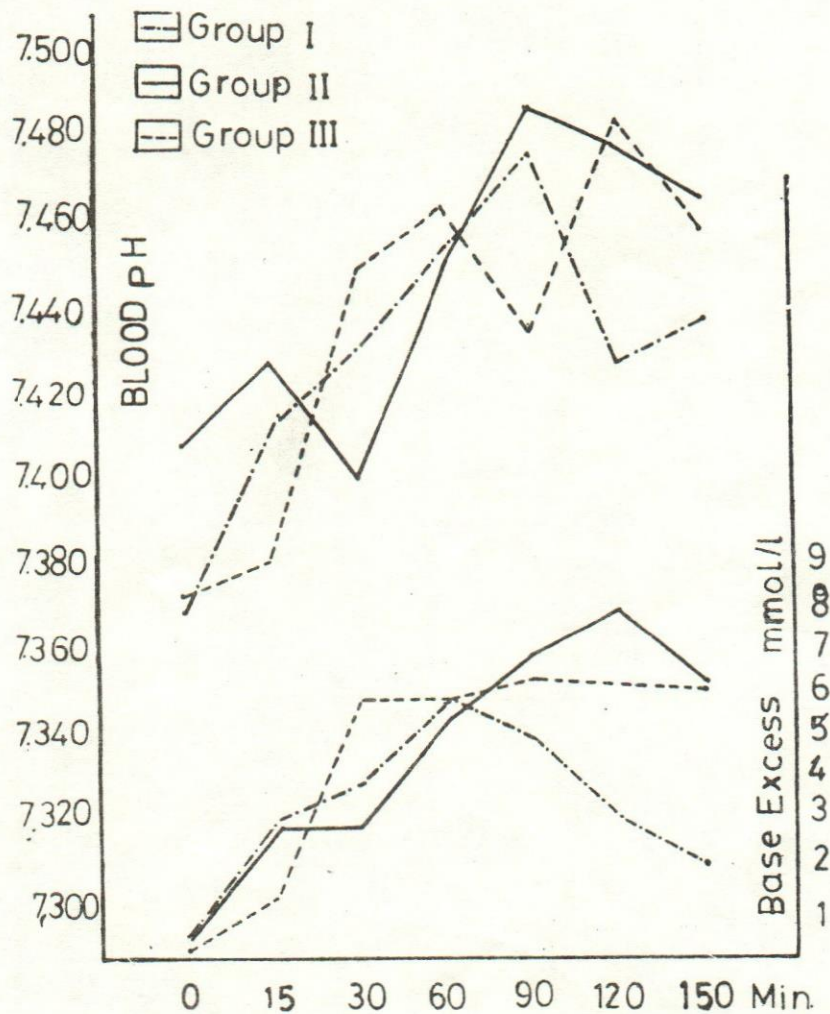
Time	pH	pCO ₂ mm Hg	pO ₂ mm Hg	HCO ₃ mmol/l	TCO ₂ mmol/l	B.E. mmol/l
0	7.370	42.0	35.7	24.2	25.4	-0.6
15	7.416	42.8	33.4	27.4	28.8	3.3
30	7.433	42.3	38.4	28.2	29.5	4.2
60	7.457	43.2	36.9	33.2	31.1	6.1
90	7.469	39.0	35.6	28.3	29.6	5.2
120	7.427	41.0	46.1	27.1	28.4	3.2
150	7.441	37.6	38.3	25.5	26.6	2.2

Table (3): Mean values of blood gases and acid-base balance under the effect of 0.6 mg/Kg body weight rompun (Group II).

Time	pH	pCO ₂ mm Hg	pO ₂ mm Hg	HCO ₃ mmol/l	TCO ₂ mmol/l	B.E. mmol/l
0	7.418	37.1	28.1	24.0	25.0	0.5
15	7.429	40.7	35.3	26.9	28.1	3.0
30	7.407	42.0	38.3	26.4	27.6	2.0
60	7.456	41.2	36.2	29.1	30.4	5.5
90	7.496	38.5	37.5	29.6	30.7	7.0
120	7.479	42.7	46.6	31.6	32.9	8.1
150	7.469	41.5	37.6	30.2	31.4	6.5

M.A. ALI, *et al.***Table (4):** Mean values of blood gases and acid-base balance under the effect of 1.0 mg/Kg body weight rompun (Group III).

Time	pH	pCO ₂ mm Hg	pO ₂ mm Hg	HCO ₃ mmol/l	TCO ₂ mmol/l	B.E. mmol/l
0	7.372	43.6	33.4	25.2	26.5	0.2
15	7.384	44.4	43.4	26.5	27.9	1.5
30	7.451	42.8	39.8	29.7	30.8	6.1
60	7.466	40.6	41.6	29.4	30.7	6.0
90	7.437	38.7	39.2	26.0	27.2	6.6
120	7.485	39.0	42.5	29.2	30.4	6.4
150	7.460	42.1	39.3	29.9	31.2	6.3

**Fig. (1):** The mean values of blood pH and base-excess (mmol/l) under the different doses of rompun.

RESULTS

Table 1. The effect of drug doses and treatment regimen under the first 24 h of the study (Group I).

Time (h)	100% (mg/L)	50% (mg/L)	25% (mg/L)	12.5% (mg/L)
0	0.0	0.0	0.0	0.0
10	1.2	0.6	0.3	0.15
20	2.4	1.2	0.6	0.3
30	3.6	1.8	0.9	0.45
40	4.8	2.4	1.2	0.6
50	6.0	3.0	1.5	0.75
60	7.2	3.6	1.8	0.9
70	8.4	4.2	2.1	1.05
80	9.6	4.8	2.4	1.2
90	10.8	5.4	2.7	1.35
100	12.0	6.0	3.0	1.5

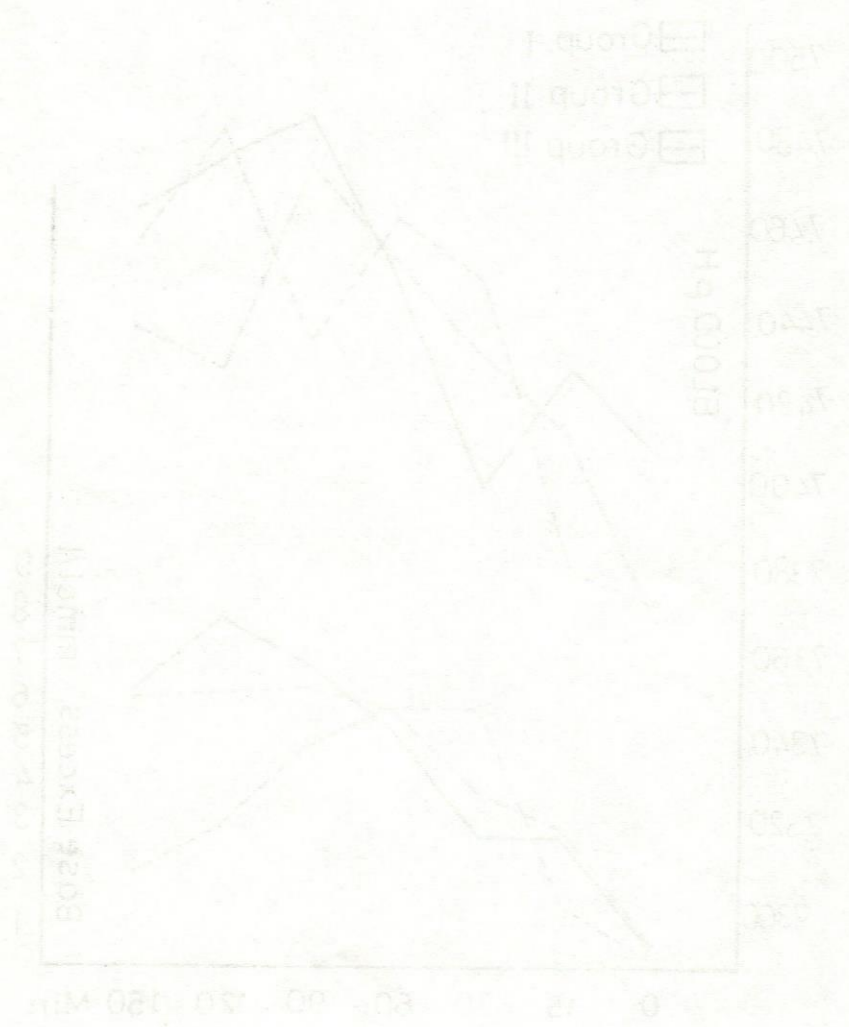


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