

Ivermectin against *Haemonchus contortus* in naturally infected Sudanese Sheep.

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ملخص البحث

استهدفت هذه الدراسة معرفة كفاءة طارد الديدان عقار اليفيرميكتين لمكافحة دودة الهمونكس كوتورتس (*Haemonchus contortus*) في الضأن السودانية المصابة طبيعياً. تم تجريع 5 رؤوس من الضأن تتراوح اعمارها من 1-2 عام بعقار اليفيرميكتين بجرعة 200 ميكروجم / كجم من وزن الجسم، وتركت المجموعة الأخرى و المصابة طبيعياً ايضاً و عددها خمسة رؤوس من الضأن بدون علاج كمجموعة تحكم. اظهر العقار انخفاضاً شديداً في إنتاج البيض لتلك الديدان بعد 24 ساعة من العلاج ووصل ذروته بعد 96 ساعة. نتائج التشريح أظهرت عدم وجود الديدان واليرقات الكامنة، كما لوحظ أيضاً عدم وجود أية اثار سمية واستنتج من هذه الدراسة الكفاءة العالية لعقار اليفيرميكتين عند الجرعة 200 ميكروجم/كجم وزن الجسم الحى ضد ديدان هيمونكس كوتورتس.

Summary

Ten naturally parasitized rams, 1-2 year old, were used to study the anthelmintic efficacy of ivermectin against *Haemonchus contortus*. Five sheep were given ivermectin (drench form) at a dosage rate of 200 µg/kg body weight. The remaining five served as infected untreated control. The drug produced a substantial reduction in egg production after 24 hours post treatment and reached its maximum effect by 96 hours post treatment. The postmortem finding revealed absence of the worms and arrested larvae. No toxic effects were observed. It is concluded that ivermectin at a dose of 200µg/kg bodyweight is highly effective against *H. contortus*.

Introduction

The stomach worm, *H. contortus*, represents a major problem to sheep trade in the Sudan. The disease caused by this parasite may lead to reduced yields of meat and milk and may lower the resistance

to many other diseases. Some reports on the prevalence of *H. contortus* infection in sheep at the different localities in the Sudan indicated that the parasite could represent a major problem to sheep industry in the country (Malek, 1959; Gagood and Eisa, 1968; El Badawi *et al.*, 1978; Eisa *et al.*, 1979; Elham and El Malik, 1997).

This study was carried out to evaluate the efficacy of ivermectin (drench form) against natural infection with *H. contortus* in sheep under Sudan condition.

Materials and Methods

Ten naturally parasitized rams, 1-2 years old and weighing 20-27 kg/body weight were used. They were purchased from Omdurman Livestock Market. The primary selection of sheep was based on poor physical condition. They were then kept in pens at the premises of the Central Veterinary Research Laboratories at Soba. The animals were identified by plastic ear tags. Fresh faecal samples were collected and examined for the presence of *H. contortus*. Based on body weight, animals were divided into two groups (A and B) of five animals each.

Faecal samples were taken twice a week. After two weeks, sheep of group A remained untreated while sheep of group B were dosed with 200µg ivermectin/kg bwt. All animals were held in confinement, fed on sorghum hay and concentrates and watered *ad libitum*. Blood (EDTA) was collected and body weight was measured weekly. All animals of group A and B were necropsied after 4 weeks, the gastrointestinal tract of each animal was removed, the contents of the abomasum washed separately and the adult worms collected and enumerated according to Anon, (1977). Representative samples from abomasae were fixed in 10% formol-saline, processed and stained as described by Clayden (1971). Fresh abomasa were examined for the presence of arrested larvae using 1% Hcl and pepsin for digestion of the abomasal mucosae. The recovered larvae were identified and counted according to Soulsby (1982). Blood samples were examined for Hb concentration and PCV as described by Schalm *et al.* (1975). The faecal egg count was determined by the McMaster method (Anon, 1977).

Results

Haemoglobin (Hb) concentration:

The results of Hb concentration of untreated and treated sheep that were naturally infected with *H. contortus* showed significant difference ($P<0.05$). The level of Hb concentration of untreated sheep slightly decreased from 5.68 to 5.04 g/dl while that of ivermectin treated sheep was increased from 6.32 to 7.56 g/dl. (Table 1).

Packed cell volume (PCV):

The mean packed cell volume (PCV) of untreated sheep that naturally infected with *H. contortus* decreased from 17.6 to 15.6% on day 28 while treated sheep showed an increase of PCV from 19 to 21.2% on day 28. Statistical analysis showed significant difference ($P<0.001$) (Table 2).

Body weight:

The mean value of body weight of untreated naturally infected sheep with *H. contortus* decreased from 19.4 to 16.6 kg while the mean value of body weight of treated sheep returned to normal body weight and ranged between 19.4–19.2kg (significant difference $P<0.05$) (Table 3).

Faecal eggs count (epg):

The mean faecal egg count per gram of untreated sheep was 2680 on day 28 while that of treated naturally infected sheep decreased till disappearance of eggs on day 16. Statistical analysis showed significant difference ($P<0.05$) (Table 4).

Macroscopic and microscopic finding:

In general all carcasses of untreated sheep were emaciated and in poor health condition. Pathological findings were haemorrhage, congestion, oedema and thickening of the abomasal mucosa. In some cases the erroded mucosa was covered with clots of blood. The liver, kidneys and mucous membranes were anaemic. Their abomasal contents included adult *H. controus* (140-415 worm) and arrested L₄ Larvae (0-100 Larvae). Meanwhile, treated sheep showed minor abomasal gross lesions and contained no adult worm or arrested L₄ larvae.

The microscopic picture of the abomasal sections of untreated sheep showed marked cellular inflammatory reaction consisting

Table 1: Hb g/dl in group A and B

Group	Day								F value	P value
	1	4	8	12	16	20	24	28		
A X ±SD	5.68±0.9	5.68± 0.7	5.24± 0.45	5.38± 0.3	5.34±0.466	5.3± 0.33	5.16 ±0.43	5.04 ±0.3	NS 0.9	>0.05
	Pre-treatment				Post-treatment				XX 2.07	<0.05
B X ±SD	6.32 ±1.25	6.08 ±0.6	5.6 ±0.74	5.48 ±1.4	5.9 ±1.18	6.52± 0.8	6.84 ±0.9	7.56 ±1.3		

A = untreated naturally infected sheep, B = Treated (ivermectin) naturally infected sheep, X = Mean, NS = not significant, XX = significant data

Table 2: PCV % in group A and B

Group	Day								F value	P value
	1	4	8	12	16	20	24	28		
A X ±SD	17.6 ± 2.6	17.9 ±2.6	16.4 ±1.7	16.4 ±1.1	16.8 ±1.3	16.2 ±0.8	16.4 ±1.14	15.6 ±0.8	NS 1.02	>0.05
	Pre-treatment				Post-treatment				0.95	<0.05
B X ±SD	19 ± 3.4	19.2 ±2.8	17.2 ±2.41	17.4 ±4.4	17.6 ±3.21	19.8 ±2.7	20 ± 2.4	21.2 ±3.6		

A = untreated naturally infected sheep, B = Treated (ivermectin) naturally infected sheep, X = Mean, SD = Standard deviation, NS = not significant, XX = significant data

Table 3: Body weight (Kg) in group A and B

Group	Day								F value	P value
	1	4	8	12	16	20	24	28		
A X ±SD	19.4 ± 3.6	19.4 ±3.6	16.4 ±1.7	18.6 ±3.6	18.2 ±3.27	17.9 ±3.2	17.6 ±3.02	16.4 ±2.5	NS 0.46	>0.05
	Pre-treatment				Post-treatment					
B X ±SD	19 ± 3.4	19.2 ±3.9	19 ±4.07	18.7 ±3.9	18.9 ±4.23	19 ±4.1	19 ± 4.14	19.2 ±4.08	0.01	<0.05

Table 4: Faecal egg count (epg) in group A and B

Group	Day								F value	P value
	1	4	8	12	16	20	24	28		
A X ±SD	3200 ±1901	3840±2681	6160±2078	9240±12100	4780 ±1640	5540±1095	4260 ±1272	2680 ±795	NS 0.46	>0.05
	Pre-treatment				Post-treatment					
B X ±SD	5640±2178	8240±5316	7600±2742	7920 ±4439	0.0 ±0.0	0.0±0.0	0.0 ±0.0	0.0 ±0.0	0.01	<0.05

A = untreated naturally infected sheep, B = Treated (ivermectin) naturally infected sheep, X = Mean, SD = Standard deviation, NS = not significant, XX = significant data

mainly of eosinophils, mononuclear cells, plasma cells and damaged epithelial cells. While those of the treated sheep revealed minor cellular reactions.

Discussion

The results of the experimental studies showed that ivermectin (drench form) had produced a substantial reduction on egg production by 24 hours post treatment and attained its maximum effect at 96 hours post- treatment. A pronounced effect was produced on *H. contortus* since the results showed complete absence of worms and arrested larvae. It is concluded that ivermectin is highly effective against adult *H. contortus* infection and its arrested larvae in sheep. These results agreed with those of Hotson (1983) and Andrasko *et al.* (1988). Also similar findings were reported by Taylor *et al.* (1990) Tado *et al.* (1992) and Gogolewsky *et al.* (1995). These results suggest that Ivermectin is economically feasible for the treatment of sheep that are naturally infected with *H. contortus* in the Sudan.

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