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Effect of Tulathromycin on Blood Picture and Some Biochemical Parameters In Lambs Suffering From Respiratory Manifestations

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ABSTRACT

Thirty lambs (2-6 month old) of both sexes were selected from El-Ibrahemia City in Sharkia Province. Fifteen were showing respiratory signs and other 15 were apparently normal (control group). Hematological and biochemical analysis were conducted on blood samples of normal and diseased lambs before and after treatment. A very highly significant increase in the total leukocytic count and insignificant changes of the total erythrocytic count, hemoglobin content and packed cell volume were found. There was a significant increase in the ALT activity ($P<0.01$) and urea level ($P<0.001$), while the other measured parameters showed non significant changes. Noticeable clinical improvement was observed in the diseased lambs after subcutaneous administration of a single dose of tulathromycin (1ml/40 kg B.wt.). All the biochemical parameters regained their normal levels, seven day following treatment.

INTRODUCTION

The sheep are among the important farm animals which add to the economy of the country. They provide mutton and milk for human consumption besides wool and hide.

The respiratory affections constitute a common problem for sheep, particularly lambs, causing serious economic losses and mortalities *(1, 2)*.

Tulathromycin is a semisynthetic macrolide antibiotic (subgroup triamilide) produced by organic synthesis from a fermentation product. It is a mixture of two isomers at a ratio of 90:10 whereas the injectable solution 10% tulathromycin carried the trade name "Draxxin". It is used for treatment of the respiratory diseases in cattle and swine. Its exceptional pharmacokinetic profile produces a rapid onset of action, high concentrations of the active drug in the target tissues and a long duration of action *(3)*. It is highly effective antibiotic that prevents resistant selection, as one ml of Draxxin was sufficient for the treatment of animal having 40 kg body weight (2.5 mg tulathromycin/kg B.wt.). It showed a very good tolerance and safety at this dose. The effective spectrum included all the relevant bacterial pathogens causing respiratory diseases. This was based on its long duration (up to 15 days) which enabled Draxxin for metaphylactic use. It showed 60 at 73 times (swine and cattle, respectively) high lung level compared with serum level, leading to a rapid elimination of the pathogens *(4)*.

Meanwhile, in addition to the high sensitivity of the target pathogens to the ingredient tulathromycin, the pharmacological profile of Draxxin accounts for a considerable reduction in the resistance selection, according to current antibiotic-directives *(5)*. Whereas, the use of a large single dose of Draxxin rather than several small doses, for treatment of pigs against *Pasteurella multocida, Mycoplasma hypopneumonia* and *Actinobacillus pleuropneumonia*, would cut costs, save time, last long and reduce the risk of error *(6)*.

The objective of this study was to clarify the efficacy of tulathromycin for controlling and reducing the risk of the respiratory diseases among lambs.

MATERIALS AND METHODS

Thirty lambs (2–6 month-old) located in El-Ibrahemia City, in Sharkia Province, were equally classified into two groups. Gp. (1) was the healthy control. Gp. (2) was showing respiratory signs (cough, nasal discharge), anorexia, reduced weight gain and moderate fever.

The diseased lambs were subcutaneously injected with Draxxin (Pfizer)

at a dose rate of 1 ml/40kg B.wt. (2.5 mg tulathromycin/kg B.wt.). One injection provided a complete course of treatment.

Whole blood with and without anticoagulant were collected from jugular vein of the healthy and diseased lambs immediately before treatment and on 3rd and 7th days post-treatment with tulathromycin. The whole blood samples were used for the determination of WBCs, RBCs, Hb and PCV *(7)* and serum was separated for glucose *(8)*, total protein *(9)*, ALT and AST *(10)*, ALP *(11)*, urea nitrogen *(12)* and creatinine *(13)* determinations to monitor the effect of tulathromycin (Draxxin).

The obtained data were statistically analyzed according to *(14)*.

RESULTS

The hematological and biochemical results are depicated in Tables 1 and 2.

Table 1: Mean ± standard error of hematological parameters in the clinically healthy and respiratory affected lambs

Parameters	Clinically healthy lambs (gp.1)	diseased lambs (gp.2)	3 day post-treatment	7 day post-treatment
WBCs ($x10^3/mm^3$)	14.74 ± 0.67	24.9 ± 1.24**	17.18±0.79*	15.44 ± 0.52
RBCs ($x10^6/mm^3$)	8.22 ± 0.47	8.08 ± 0.56	8.17 ± 0.7	8.05 ± 0.75
Hb (gm%)	10.96 ± 0.43	10.9 ± 0.41	11 ± 0.33	10.64 ± 0.24
PCV (%)	49.86 ± 1.91	48.92 ± 1.92	49.28 ± 1.1	49.4 ± 1.55

* Significant at ($P < 0.05$)

** Very highly significant at ($P < 0.001$)

Table 2: Mean ± standard error of serum biochemical parameters in the clinically healthy and respiratory affected lambs.

Parameters	Clinically healthy lambs (gp.1)	diseased lambs (gp.2)	3 day post-treatment	7 day post-treatment
ALT (IU/L)	8.2 ± 0.58	11.6 ± 0.51**	9.4 ± 0.81	8.6 ± 0.68
AST (IU/L)	36.8 ± 1.36	42.4 ± 2.25	34.2 ± 2.08	35.8 ± 1.65
ALP (IU/L)	234.6 ± 2.5	240.2 ± 3.18	238.4 ± 3.96	235.2 ± 2.76
Urea (mg/dl)	21.8 ± 0.8	38.4 ±1.89***	27.2 ± 1.83*	24.4 ± 1.8
Creatinine (mg/dl)	0.89 ± 0.02	0.78 ± 0.71	0.88 ± 0.03	0.88 ± 0.08
Glucose (mg/dl)	70.12 ± 1.91	68.8 ± 4.51	69.4 ± 1.54	69.8 ± 1.39
Total protein (gm/dl)	5.86 ± 0.14	5.74 ± 0.13	5.7 ± 0.41	5.14 ± 0.55

* Significant at ($P < 0.05$)

** Highly significant at ($P < 0.01$)

*** Very highly significant at ($P < 0.001$)

DISCUSSION

The respiratory diseases represent a serious problem specially under the intensive systems of husbandry all over the world. The most obvious clinical signs, observed on the diseased lambs, were slight moist cough, nasal discharge, decreased appetite, reduced weight gain, mild depression and low grade fever. Similar findings were recorded by several investigators *(2, 15-17)*.

The Draxxin treated lambs showed disappearance of the clinical signs and improvement of the general health condition after the 1st week of treatment. Draxxin was effective against the major respiratory swine and bovine pathogens *(3)*. Two days of treatment with Draxxin, the body temperature of both swine and cattle was back to normal *(4)*. It has been observed that 24 hr after the parentral administration of Draxxin, the treated animals showed a significant recovery which was judged by the alleviation of the clinical signs *(5)*. The treated cattle showed a rapid reduction of fever and clear improvement in the general condition. The calves returned to feed and drink normally one day post-treatment. The clinical respiratory signs were improved. Ten days, after a single Draxxin injection, the majority of the animals recovered completely. The authors recommended that even under a high infection pressure, Draxxin protected the metaphylactically treated calves against the bacterial respiratory diseases.

The total leukocytic count showed a very highly significant ($P<0.001$) increase, while the RBCs, Hb and PCV showed insignificant change. These results are supported by those obtained previously *(18, 19)*. The leukocytosis was attributed to the bacterial infection and the inflammatory lesions which increased the WBCs count *(20)*.

A highly significant increase ($P<0.01$) was observed in the activity of the serum ALT in the diseased lambs when compared with those healthy ones. These data coincide with several previous studies *(2, 17, 21-23)*. Such elevation may be referred to the degenerative and necrotic changes which accompanied the hepatic *(24)* and pulmonary *(25)* lesions, due to the bacterial infection and its toxins.

The serum AST and ALP activity did not show any significant changes. Similar findings recorded previously *(18, 26-28)*.

Very highly significant increase ($P<0.001$) was found in the blood serum level of urea of the diseased lambs, while the creatinine level showed insignificant change. These findings are in agreement *(28)*, and disagree with *(2, 29-31)* previous studies. The increased blood urea nitrogen level may be attributed to the increased protein catabolism, decreased renal blood flow, febrile respiratory diseases and impaired cardiac function *(31)*.

There was a non significant changes in the serum glucose level and total protein of the diseased lambs when compared with the healthy ones. The obtained data are nearly similar to those cited in different studies *(30, 32, 33)*.

Treatment with a single dose of tulathromycin (1ml/40 kg B.wt.), resulted in improvement clinical signs in lambs 24 hrs. post-treatment. Laboratory findings revealed the return back of most of the blood and serum constituents regained their normal level 3 day pt, while the WBCs and blood urea nitrogen level remained elevated. After 7 days, an excellent response observed and the majority of the disturbed parameters, particularly WBCs and blood urea nitrogen, restored their normal level. The tulathromycin showed clinical and zootechnical advantages in the treatment of bovine pneumonia as well as improved health parameters of all the treated animals *(34, 35)*.

It could be concluded that, Draxxin (tulathromycin) is effective in the treatment of the respiratory diseases, especially in early stages of the disease. It offers a convenient and full course of therapy in a single dose.

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الملخص العربى

تأثير التولاثروميسين على صورة الدم وبعض القياسات البيوكيميائية فى حملان تعانى من مشاكل تنفسية

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أجريت هذه الدراسة على عدد ثلاثين من الحملان تتراوح أعمارها بين ٢ – ٦ شهور فى مدينة الإبراهيمية بمحافظة الشرقية ، منها ١٥ من الحملان السليمة ظاهرياً و ١٥ من الحملان المريضة اكلينيكياً. أظهر الفحص الإكلينيكى أن الحيوانات المريضة كانت تعانى من أعراض تنفسية مثل : إفرازات أنفية ، كحه، احتقان الأغشية المخاطية ، سرعة معدلات التنفس هذا بجانب فقدان الشهيه والضعف العام. وبإجراء الفحوصات الدموية والبيوكيميائية لعينات الدم المأخوذة من الحيوانات السليمة ظاهرياً والمريضة إكلينيكياً (قبل وبعد العلاج) تبين أن التغيرات فى صورة ومصل الدم فى الحملان المصابة بإضطرابات تنفسية عند مقارنتها بالسليم ظاهرياً هى :

- وجود زيادة معنوية عالية جداً فى العدد الكلى لكرات الدم البيضاء بينما لم يحدث أى تغير معنوى فى العدد الكلى لكرات الدم الحمراء وكمية الهيموجلوبين وحجم الخلايا المضغوطة.
- وجود زيادة معنوية عالية فى مستوى إنزيم الألانين أمينو ترانسفيراز مع زيادة معنوية عالية جداً فى بولينا الدم ، بينما لم يظهر أى تغير فى مستوى سكر الدم ، البروتين الكلى ، إنزيم الأسبرتيت أمينو ترانسفيراز والكرياتينين.

أوضحت النتائج التى ظهرت على الحيوانات بعد العلاج بعقار التولاثروميسين استجابة الحيوانات للعلاج واختفاء الأعراض الإكلينيكية وعودة مستوى العناصر المختلفة إلى المستوى الطبيعى تقريباً بعد أسبوع من العلاج.