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**ROLE OF HAEMATOLOGICAL PICTURE
AND BIOCHEMICAL ANALYSIS OF BLOOD SERUM
IN DIAQNOSIS OF LISTERIOSIS IN RABBITS**
(With 3 Tables)

By

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دور صورة الدم والتحليل البيوكيميائي للسيرم في
تشخيص الليستريا في الأرانب

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تم فحص صورة الدم والتحليل البيوكيميائي لسيرم دم الأرانب البالغة من نوع
نيوزيلاند المصاب بمرض الليستريا وكذلك الأرانب السليمة . وقد صم هذا البحث
لمعرفة دور الفحوصات السابق ذكرها في تشخيص مرض الليستريا في الأرانب ، وقد
لوحظ أنيميا وزيادة في عدد كرات الدم البيضاء في المجموعة المصابة كما لوحظ نقص
الألبومين وإرتفاع طفيف في جلوبيولين السيرم في المجموعة المصابة بالمقارنة
بالمجموعة السليمة ولم تظهر فروقات معنوية بين المجموعتين بالنسبة للجلوكوز
والكرياتينين واليوريايتروجين في السيرم . كما تم ملاحظة إنخفاض حاد في
الالكتروليدات في المجموعة المصابة بمقارنتها بالمجموعة السليمة . ويتضح من النتائج
السابقة أن فحص صورة الدم والتحليل البيوكيميائي للسيرم يمكن أن يلعب دورا في
تشخيص مرض الليستريا في الأرانب .

SUMMARY

Haematological picture and biochemical analysis of blood serum of naturally infected adult New Zealand rabbits with Listeria monocytogenes and healthy ones were performed. The study was designed to evaluate the role of the above mentioned examinations in the diagnosis of listeriosis in rabbits. Anaemia and leucocytosis were observed in diseased group. Hypoalbuminaemia and slight elevation of serum globulin level were evident in infected rabbits than healthy one. There were no significant differences in the changes between the two groups in case of blood serum glucose, creatinine and urea nitrogen. A severe drop in serum electrolytes was found in diseased group when compared with healthy ones. Our results indicated that haematological picture and biochemical analysis of blood serum could be of value if it is used together with other laboratory tests for diagnosis of listeriosis.

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INTRODUCTION

Listeriosis caused by Listeria monocytogenes is considered one of the major problems in rabbits; affecting health and breeding characteristics. The disease usually has low morbidity and high mortality. The incidence of the disease in rabbits in Egypt is not widely studied but a trial to isolate Listeria monocytogenes from naturally infected rabbits was done by ABDEL-WANEAS (1985). The Author was able to isolate 14 positive out of 70 examined cases which appeared clinically and pathologically diseased with listeriosis. ABDEL-MOTELIB et al. (1990) also isolated Listeria monocytogenes which was resulted in death of 60 adult New Zealand out of 250 rabbits.

The aim of this present study was to evaluate the changes in blood cells and biochemical blood serum analysis in diseased rabbit with listeriosis.

MATERIAL and METHODS

Examined Animals :

15 adult New Zealand rabbits were examined in winter 1990. 10 rabbits from them were diagnosed as naturally infected with Listeria monocytogenes (group I) via clinical signs (rolling, diarrhea, eye affection, vaginal blood discharge and infertility that noticed from the breeding record), pathological examination (ulcer formation of uterine mucosa, small and numerous necrotic foci of the liver and spleen in addition to nodular formation in the lungs) as well as isolation and identification of the micro-organism (ABDEL-METELIB et al., 1990). The other five rabbits were clinically healthy and were used as control (group II).

Samples :

Two blood samples were collected from both acutely diseased as well as control healthy rabbits. The blood samples were collected after slaughtering the rabbits. Heparinized blood was used for haematological studies while non-heparinized blood was used for biochemical analysis.

Haemtological Picture :

Heparinized blood was analyzed for total count of Erythrocytes (TRBCs), total Leucocytes (TWBCs) per cubic mm blood, Hearnoglobin (Hb%) using electronic blood cell counter (C x 310 Sweden). Packed cell volume (PCV %) by using microhamatocrit centrifugation (COLES, 1980). Sedimentation rate (SR) by Westergreen tube after SCHALM (1970).

Biochemical blood serum analysis :

Total proteins, albumin, glucose, creatinine and urea nitrogen were estimated using test kits of bio-Merieux, Bain, France after the methods of HENRY (1964); SIEST et al. (1981); HUSDAN (1968) and CHANEY and MARBACH (1962) respectively. Sodium and potassium levels were determined using flame photometer (Coorning mod. 400). Chloride level was determined by chloridometer (mod. 925).

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RESULTS

Statistical analysis of haematological results of infected and healthy control rabbits was illustrated in table 1. Table 1 reveals significant drop in both total RBCs, Hb and PCV reading in diseased rabbits (group I) if compared with clinically healthy rabbits (group II). Total WBCs count in diseased rabbits on the contrary behaved slight significant leucocytosis.

Table 2 reveals that blood serum total protein, albumin, A/G ratio, Glucose and urea nitrogen behaved decreased levels in group I in comparison to group II. Differences however were non significant except for albumin. Blood serum globulin and creatinine levels in group I show nonsignificant increase when compared with group II.

Electrolytes level (Table 3) showed highly significant decrease in Na, K and Cl levels in the blood serum of diseased rabbits if compared with those clinically healthy ones.

DISCUSSION

The reduced total erythrocyte count and haemoglobin content in the diseased rabbits (group I) can be attributed to inhibition in the blood formation in blood forming organs as spleen, which affected during the course of infection. Necrotic foci in the spleen were recorded in our infected animals and also in experimentally infected rabbits with Listeria monocytogenes (VETSI & FAMENES, 1965 and ONET & KALOMEN, 1967). GRAY and KILLINGER (1966), SRIVASTAVA and SIDDIQUE (1974), BASHER et al. (1984) and ABDEL-WANEAS (1985) explained the anaemic condition erythrocytes or toxic waste products originated from the infection. The increase in total count of leucocytes in diseased rabbits (group I) is indicative for the bacterial infection occurrence. Changes in blood picture including leucocytosis were recorded in experimentally infected rabbits by HAHNEFELD and HAHNEFELD (1960) and SEELIGER (1961). Similar results in birds were recorded by COLE (1941), GRAY (1958) and GROSS (1984) Such changes are influenced by the virulence and culture character of Listeria monocytogenes. The highly significant decrease in PCV % in diseased rabbits when compared with healthy ones reflect the degree of severity of diarrhea that occurred during the course of the disease when great losses of body fluids occurred.

Results of the biochemical blood serum analysis revealed no significant differences in total protein between group I and II. However, there were decrease in blood serum albumin with an increase in serum globulin in group I than group II. Hypoalbuminaemia can be explained by inhibition of albumin synthesis due to affection of the liver during the course of the disease.

Necrotic foci of the liver were reported in naturally infected dead rabbits (CAVILL, 1967; ABDEL-WANEAS, 1985 and ABDEL-MOTELIB, 1990). The increase in blood serum globulin in diseased rabbits (group I) indicates the increase in antibodies

titer. COLES (1980) reported that infections are accompanied by invasion of the body by foreign materials whatever they are of bacterial, viral, protozoal or parasitic origin—usually result in an increase in the concentration of gamma globulins. There were no significant variations in blood serum glucose, creatinine and urea nitrogen between diseased and healthy control rabbits. Interpretation of such result is rather different since BURNS and DeLANNOY (1966) and KOZMA et al. (1974) reported that there are significant differences in published clinical chemistry values for the same strain of rabbit for example the serum glucose level in New Zealand white rabbits published by BURNS and DeLANNOY (1966) is only about half the value reported by FOX et al. (1970).

The significantly decrease in the level of blood serum electrolytes (Na, J, Cl) in rabbits naturally infected with Listeria monocytogenes can be attributed to the severe diarrhoea during the course of the disease. Diarrhea was also observed by STEFFEN (1962); GALLI (1963); TOSHKOVA et al. (1965); CAVILL (1967) and ABDEL-WANEAS (1985).

As a conclusion that the haematological variations and biochemical analysis of blood serum of naturally infected rabbits play a minor role in diagnosis of listeriosis.

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Table 1: Haematological picture of naturally infected rabbits blood with listeria monocytogenes and healthy control rabbits.

Blood parameter	Groups		References
	I	II	
RBC's	4.15 ± 0.21**	5.1 ± 0.18	5.67 ± 0.77
Hb	9.47 ± 0.82**	11.58 ± 0.42	12.0 ± 1.38
(Gram %)	**		(a)
PCV (%)	27.6 ± 0.67	33.2 ± 1.49	36 - 38
		(b)	(b)
WBC's	12.51 ± 2.26	10.02 ± 1.12	10.05 ± 1.73
3 3			(a)
10/ mm.		(a)	

*: $P/0.05$ **: $P=0.01$ (a) = Dougherty and White (1944) (b) = Schalm (1965).

Table 2: Biochemical analysis of naturally infected rabbits with listeria monocytogenes and healthy control rabbits blood serum.

Constituent	Groups		References
	I	II	
Total protein (gm%)	8.4 ± 0.55	8.5 ± 0.36	6.3 ± 0.1
			(c)
Albumin (gm %)	3.6 ± 0.17*	4.8 ± 0.42	-
Globulin (gm %)	4.76 ± 0.54	3.68 ± 0.42	-
A/G ratio	0.86 ± 0.1	0.99 ± 0.1	-
Glucose (mg %)	113.4 ± 0.02	128.1 ± 10.4	73.4 ± 1.0
			(d)
Creatinine (mg %)	0.86 ± 0.15	0.72 ± 0.10	1.59 ± 0.3
Urea nitrogen (gm %)	16.87 ± 1.47	18.4 ± 0.18	19.2 ± 0.4
			(d)

* = $P/0.05$ (c) = Burroughs (1971) (d) = Burns and Delannoy (1966).

Table 3: Chemical analysis of naturally infected rabbits with listeria monocytogenes and healthy control rabbits blood serum.

Electrolyte	Groups		References
	I	II	
Sodium (mEq/L)	118.2 ± 1.39**	146.88 ± 1.311	125.4 ± 0.79 (e)
Potassium (mEq/L)	4.68 ± 0.13**	7.16 ± 0.42	5.1 ± 0.1 (c)
Chloride (mEq/L)	50.4 ± 0.86**	181.7 ± 2.93	108.7 ± 0.8 (c)

** = $P/0.01$

(e) = Harper (1965)