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تقييم مستوى انزيمات الدم في الحملان المريضة بضعف العضلات

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استهدفت هذه الدراسة تقدير مستوى بعض انزيمات مصل الدم في
٥٥ حملا سليمة الكليتيكا وكذلك ٣٠ حملا مصابة بمرض ضعف العضلات (NMD)
وقد أظهرت نتائج التحليل الاحصائي زيادة معنوية في مستوى انزيم
SGOT, SGPT, SLDH, SCPK في الحيوانات المريضة عن مثيلاتها
السليمة الكليتيكا .

بحقن الحيوانات المريضة بجرعة واحدة من مركب السيلينيوم وفيتامين (هـ)
بدأ التحسن يظهر بوضوح على هذه الحيوانات ، كما وأن مستوى أنشـطة
الانزيمات تحت الدراسة قد اقترب من النسبة الطبيعية بعد اسبوع من العلاج
وأن الحيوانات المحقونة لم تعاودها الاصابة بالمرض مرة أخرى .

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**EVALUATION OF SERUM ENZYMATIC ACTIVITY IN LAMBS
WITH NUTRITIONAL MUSCULAR DYSTROPHY**
(With 2 Tables & 1 Fig.)

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SUMMARY

The activity of muscular-specific enzymes (S-GOT, S-GPT, S-LDH, S-CPK) were found to be normal in 55 of 85 newly borne lambs (7-10 days old) in a flock with nutritional muscular dystrophy. The recorded values were 30.2 ± 5.04 , 9.1 ± 4.05 , 613.0 ± 61.0 and 23.1 ± 2.0 mu/ml respectively.

Activities of these enzymes were very high in remaining animals (35.3% of flock). The value reached : for S-GOT 278.7 ± 13.1 , S-GPT 84.8 ± 6.7 , S-LDH 1261.8 ± 33.2 and S-CPK 995.5 ± 1.04 mu/ml. A prophylactic intramuscular dosage of 1 mg selenium and 300 mg tocopherol acetate (one dose) had the effect that within one week the increased enzyme activity had returned to the normal values. None of treated lambs had muscular dystrophy later.

INTRODUCTION

Nutritional muscular dystrophy (NMD) occurs spontaneously in lambs in many areas (HARTLEY & GRANT, 1961 MUTH, 1963 and ALLAWAY & HODGSON, 1964) and can result in substantial economic loss reaching a high significant figures every years to flock owners. The relationship of NMD in yearling lambs to nutritional factors had been described by HADLOW (1974) and ALLEN *et al.* (1974).

Laboratory tests of varying complexity and sensitivity are available for the diagnosis of tissue destruction. One of these, the determination of various enzyme activities in the serum. The increased level of serum glutamic-oxalacetic transaminase (GOT) or lactic dehydrogenase (LDH) associated with cellular destruction have received considerable recent attention (GOLEN, 1975). The increased levels of these enzymes are used recently as a diagnostic aid in human myocardial infarction (ROBERT & SOBEL, 1976). Little information is available concerning blood enzymes level in some animal diseases.

Serum GOT and LDH levels were found to increase greatly in NMD of ruminant animals (TOLLERSRUD *et al.* 1971 and FELDHEIM, 1973). Plasma creatinine phosphokinase (CPK) activity is the most commonly used laboratory aid in diagnosis of muscular dystrophy in calves and lambs (BLOOD *et al.* 1979).

In Egypt available literature lack about the changes in blood serum enzymes following natural cases of nutritional muscular dystrophy. This present work deals with changes in serum GOT, GPT, LDH and CPK in cases of spontaneous outbreak of NMD among newly borne lambs.

MATERIAL and METHODS

The author have been called by the owner of flock of sheep comprising of 50 ewes aged 1.5-5 years old and 85 newly borne lambs aged 7-30 days. Owner's complain included visible lameness of dams. In born lambs, stiff and unsteady gait, walking gradually became more difficult untill the animals could no longer stand. Some affected lambs were observed in sternal recumbancy and unable to stand but with an abvious desire to stand. The dams were ranged in fields where post harvesting remnant were still in the ground. The time was June-July, 1982.

General examination of the flock revealed that painless lameness was evident in 30 lambs. Lambs behaved polynoea, tachycardia. Body temperature ranged between normal to slightly elevated. On palpation, gluteal and shoulder muscules masses tend to be swllen and firm. Most affected lambs retain their appetite and will suck if held up to the dam or eat if hand-fed.

The case was diffecult to diagnose in dams, however the appearance of previously mentioned clinical signs in lambs announced the suspicious of nutritional muscular disease. Neccessity for difinited diagnosis needed estimation of serum levels of muscle-specific enzymes (S-GOT, S-GPT, S-LDH and S-CPK). Blood serum samples were collected from lambs for estimation of aimed enzymes at once and one week post treatment. A prophylactic treatment included intramuscular dosage of 300 mg -tocopherol and 1 mg sodium selenite per animal.

The S-GOT and S-GPT were determined by the method of REITMAN and FRANKEL (1957); S-LDH according WEISSHAAR, *et al.* (1975) and S-CPK according to SZASZ, *et al.* (1970). The chemicals for these enzyme assay were obtained as test kits from Boehringer and Soehne Co. Mannhiem, W. Germany.

RESULTS

In this work, the activity of muscle-specific enzymes (GOT, GPT, LDH, CPK) in the serum of 85 lambs were measured. Only 55 of 85 lambs (64.7%) at age of 7-10 days were apparently healthy with normal serum activity. The serum enzyme values were S-GOT, 9-47 mu/ml, S-GPT activity 0-21 mu/ml; LDH, 300-1120 mu/ml and S-CPK 0-52 mu/ml. The mean values of determined enzymes are presented in table (1).

The rest of animals 30 lambs (35.3%) already had a significant rise in enzyme activity (Table 2).

A prophylactic intramuscular dosage of 1 mg sodium selenite and 300 mg of -tecopherol in clinically diseased lambs had the effect that within one week the increased enzyme activity had dropped again into the normal pattern. The lambs becamed apparently healthy without any abnormalities (Table 2).

DISCUSSION

A prominant increased level in S-GOT appeared in lambs in the second group, (Table 2) was in agreement with the results previously recorded in lambs by BLINCO & DYE, (1958) and BOSTEDT, (1976). The later recorded levels of about 2354 mu/ml in natural cases of NMD instead of 28.0 mU/ml in normal lambs. Lambs fed on vitamin E or selenium deficient diet behaved highly significant elevated S-GOT (up to 1495-1536 units/ml) (EWAN *et al.* 1968 and WHANGER *et al.* 1977). When vitamin E or selenium were supplemented in the diet of such animals, the authors

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observed a significantly decreased S-GOT level. The increased level of S-GOT, found in white muscles disease, demonstrates the breakdown of the cell-blood barrier permitting this enzyme to enter the blood. In spite of some possible errors, S-GOT results, showed a significant relationship to the occurrence of the disease. The relationship was to be expected with samples obtained at age later than 14 days, since in most cases, these samples were taken from lambs that were already showing signs of the disease. This confirms the observations of BLINCO & DYE, (1958) that the S-GOT test provides a useful means of supporting a diagnosis of nutritional muscular disease.

The available literature lacks much about the changes in activity of S-GPT in white muscle disease. The present study however, revealed a symmetrical changes in S-GPT like that of S-GOT. The increased levels S-GPT found in the animals of group II were probably derived from the muscles damage. WROBELEWSKI (1959) recorded that the extend of enzyme elevation with muscular disease is almost invariable less than 300 units and does not reach a very high value observed in acute hepatocellular damage. BOSTEDT (1976) showed a more pronounced change in the serum enzyme pattern in lambs with NHD. EL-SHERIF *et al.* (1981) mentioned that buffalo-calves suffering from NMD showed level of S-GPT of 48.5 ± 6.2 U/L that dropped to 17.8 ± 8.2 U/L after treatment by vitamin E and selenium. TAHER (1982), in another study on natural cases of NMD in buffalo calves, recorded level of 127.0 U/L.

The increased lactic dehydrogenase (LDH) activity levels found in lambs with white muscle disease (group II) was of the same order as that for S-GOT. It will be noticed that serum LDH and transaminase presumably have a common origin in the destruction of tissue cells. Increased plasma LDH in lambs with NMD has been reported previously (TOLLERSRUD, 1971 and SCHMIDT & SCHMIDT, 1973).

The correlation fo S-GOT & S-LDH (Fig. 1) indicates that they are released from damaged muscular dystrophy in equivalent amonutes. Hence release of this enzyme is a part of general breakdown of the affected cells rather than a specific excretion of either. In view of correlation between those two enzymes, either could be used as a diagnostic aid in white muscle disease. KELLER (1974), WHANGER *et al.* (1977) and BOSTEDT & SCHRADEL (1978) demonstrated that the rise of serum enzyme LDH activity in serum appeared to bear some relationship to the extent of muscular damage.

From table (2) it appeared that the activity of serum enzyme creatinine phosphokinase (CPK) was extremely elevated in natural cases of NMD in lambs. Such elevation had been demonstrated previously by BUCHANAN *et al.* (1969); TOLLERASRUD *et al.* (1971) in sheep with nutritional muscular dystrophy. In sheep with acute muscular dystrophy the CPK level will be increased usually above 1000 i.U/L, commonly increased to 5000-10,000 i.U/L and not uncommonly increased in the lambs from ewes not given selenium injection.

CPK is present in skeletal and cardiac muscles tissue of bovines in high concentration compared with all other tissues (KELLER, 1974 and BOYED, 1976). The high significant serum activity of this enzyme in the present work, therefore, specifically indicated loss of intracellular CPK from muscle cells to the blood. The especially high activity of CPK found in muscular dystrophy and the great increased serum CPK found in NMD supports the view that raised plasma CPK is a diagnostic indication of myopathy or cardiomyopathy (GERBER, 1964 and ANDERSON *et al.* 1976).

Normal recorded level for studied enzymes following one week post suggested treatment indicated successful treatment. A prophylactic intramuscular dosage of 1 mg selenium and 300 mg -tocopherol acetate for diseased lambs had the effect that within one week the increased enzyme activity had dropped again into the normal pattern. Non of the animal treated in this

way suffered from muscle dystrophy at a later date. The successful recovery of acute clinical cases following vitamin E and selenium administration had been reported previously by BUSCHANAN-SMITH *et al.* (1964); MUDD & MACKIE, (1973) and TAHER, (1981).

In conclusion, it has been proved that blood serum GOT, GPT, LDH and CPK estimation appeared very useful in confirming muscular damage and also in assessing the prognosis, irrespective of the causal agent involved, provided the duration of illness is taken into account. In addition this condition which typically affect lambs during their first weeks of life is contributable with vitamin E and selenium deficiency.

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Table (1): The averages normal values of muscular-apeific enzymes (mU/mL)

		GOT	GPT	LDH	CPK
Group (I) lambs	\bar{X}	30.2	9.1	613.0	23.1
with normal serum	$\pm S.$	± 5.04	± 4.05	61.00	2.00
enzyme activity					

Table (2): The averages abnormal values of serum enzyme in discased lambs

		GOT	GPT	LDH	CPK
Group (2) lambs with abnormal serum enzyme activity	\bar{X}	78.7	84.8	1261.8	995.4
	$\pm s$	13.1	6.7	33.3	± 31.04
One week after treatment	\bar{X}	29.4	9.5	519.2	22.1
	$\pm s$	4.32	0.99	49.11	1.3



