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CLINICAL STUDIES ON WOOL SLIP (ALOPECIA) IN SHEEP WITH REFERENCE TO HAEMATOLOGICAL AND BIOCHEMICAL CHANGES

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SUMMARY

This investigation was conducted on 34 lambs (1-7 months old) and 43 ewes (2-5 years old) of which 28 lambs and 29 ewes showed alopecia, wool abnormalities and emaciation. Sheep were reared among indoor flock of the faculty of Agriculture, Cairo Unviersity. Blood serum levels of copper, iron, zinc, ceruloplasmin activity, total protein, albumin, globulin, A/G ratio, alkaline phosphatase (AP) and lactic dehydrogenase (LDH) were estimated. Haemoglobin (Hb), haematocrit (PCV), red blood Cells (RBC), total and differential leucocytic count were also investigated. The study revealed that alopecic lambs and ewes suffered from deficiency of copper ($P<0.00$) and iron ($P<0.001$) in their blood sera resulting in poor growth, unthriftness, alopecia and wool abnormalities. Serum ceruloplasmin activity, total protein, albumin, A/G ratio were also significantly decreased in alopecic sheep. However, scrum zinc, globulin, alkaline phosphatase and lactic dehydrogenase were non significantly altered. The erythron revealed microcytic hypochromic anaemia and the leucon showed non significant alterations. Addition of mineral mixture containing an adequate amount of copper and iron to the concentrate mixture for one month resulted in improvement of the condition.

INTRODUCTION

Alopecia (Atrichia, Baldness) is sheep may result form bacterial and viral infections, parasites, toxic agents, metabolic disorders, hormonal disturbances or nutritional deficiencies (Nelson et al., 1984; Morgan et al., 1984; Morgan et al., 1986 and El-Sayed et al., 1994). Absence of hair coat makes the animal more exposed to sudden changes of climatic conditions (Radostits et al., 1994). Wool seemed to be influenced by dietary intake of some important trace clements. Fawzia (1971); Nabila (1983): Ismail et al., (1988); Taha et al., (1993); and Metwalli et al., (1997) recorded alopecia in sheep associated with low serum levels of copper. Copper is an essential trace element for animals and is required for body, bone and wool growth, pigmentation, mylination of nerve fibers (Underwood, 1977). Copper deficiency is associated with wide variety of

disorders in ruminants. These include anaemia, severe diarrhoea, depressed growth, change in the condition of the wool as well as neonatal ataxia (Underwood , 1981 and McPhee and Cawley, 1988).

The objectives of this study were to investigate the clinical picture, haematological findings and to estimate some serum trace elements and biochemical constituents in alopecia and wool abnormalities in a sheep flock as well as treatment of the diseased cases.

MATERIALS AND METHODS

This investigation was conducted on 34 lambs (1-7 months, old) months, old) and 43 ewes (2-5 years, old) of which 28 lambs and 29 ewes showed alopecia with varying severity, wool abormalities and emaciation. The other 6 lambs and 14 ewes have served as control and were healthy depending upon clinical and laboratory examinations. Sheep were reared among indoor flock of the farm of the Faculty of Agriculture, Cairo University. Commercial concentrate ration* at rate of 250 g/head/daily was offered to the animals. Rice straw was administrred ad.lib. No feed additives were supplied. The animals were freely watered.

Whole blood samples with EDTA were obtained from both healthy and alopecic sheep for determination of haemoglobin, haematocrit, RBCs, total and differential leucocytic count (Coles, 1986).

Serum samples were obtained from both healthy and alopecic sheep and analysed for copper (Zak, 1958), iron (Tabacco et al., 1981), Zinc using specrophotometric atomic absorption (Meret and Hinken, 1971), total protein (Weichselbaum, 1946), albumin (Doumas and Watson, 1971), globulin by subtracion, alkaline phosphatase (Kind and King, 1954), ceruloplasmin activity (Schosinsky et al., 1974) and lactic dehydrogenase (Anon, 1970).

Deep skin serapings were taken from the periphery of the alopecic areas of affected animals and examined for dermatophytes and metazoan parasite (Coles, 1986), Faecal samples were taken from both healthy and alopecic animals and examined for gastrointestinal parasites (Coles, 1986).

The obtained data were statistically analysed according to Snedecor and Cochran (1976).

Therapeutic trials were done for treatment and prophylaxis of alopecia in the examined sheep flock. Concentrate mixture was administered 1-2 kg/head/daily for all animals in the flock, with addition of mineral mixture* containing copper (500 mg/kg) and iron (10000 mg/kg) in a dose of 5 g/head/daily.

* Contain 40% cotton seed cake, 20% wheat bran, 20% yellow corn, 10% lime stone and 1% common salt.
* Tonimix, Virbac, Egypt (Water dispersible powder of vitamins, trace elements and methionine).

RESULTS

Clinical findings

Alopeciia was the main complaint in this sheep flock (table 1 and Fig. 1). In ewes, alopecia was extensive particularly over the dorsal aspects of the thoracic and lumbar regions (Fig. 2). In lambs, alopecia was scattered on the entire body surface particularly on tail root, rump, neck, ventral abdomen and legs (Fig. 3) . In all affected lambs and ewes no obvious lesions on the skin, pruritis was not evident and the wool peeled off easily. All affected animals were emaciated, have pale mucous membranes and rapid pulse rates. Body temperaure and respiratory rate were within normal. Wool abnormalities including loss of crimp, steely appearance and depigmentation were noticed. Soft faeces was evident in most cases, however, watery diarrhoea was observed only in few cases.

Table (1): Number and percentage of alopecic lambs and ewes in the examined flock

Animal	Number of sheep			Percentage
	Total	Healthy	Alopecic	
Sheep	77	20	57	77.7
Ewes	43	14	29	67.4
: Lactating	16	4	12	75
Pregnant	13	4	9	69.2
Dry	14	6	8	57.1
Lambs	34	6	28	82.4
Suckling	13	3	10	76.9
Weaned	21	3	18	85.7

Table (2): Some trace elements in both healthy and alopecic lambs and ewes (mean values ± standard error)

Parameters	Healthy sheep		Alopecic sheep	
	Lambs (N = 6)	Ewes (N = 14)	Lambs (N = 28)	Ewes (N = 29)
Copper (μg/dl)	115.20 ± 9.20	121.16 ± 9.77	65.40 ± 8.55 ***	70.39 ± 9.77 ***
Iron (μg/dl)	150.20 ± 8.75	164.11 ± 9.00	95.60 ± 8.50 ***	100.10 ± 7.00 ***
Zinc (μg/dl)	145.50 ± 11.80	155.60 ± 12.50	133.30 ± 12.33	145.20 ± 6.88

* P < 0.05   ** P < 0.01   *** P < 0.001

Table (3): Some serum biochemial constituents in both healthy and alopecic lambs and ewes (mean values ± standard error)

Parameters	Healthy sheep		Alopecic sheep	
	Lambs (N = 6)	Ewes (N = 14)	Lambs (N = 28)	Ewes (N = 29)
Total protein (g/dl)	8.0 ± 0.14	8.8 ± 0.17	6.70 ± 0.15**	7.6 ± 0.16 **
Albumin (g/dl)	4.2 ± 0.15	4.8 ± 0.16	2.7 ± 0.15 **	3.1 ± 0.18 **
Globulin (g/dl)	3.8 ± 0.12	4.0 ± 0.11	3.8 ± 0.10	4.0 ± 0.16
A/G ratio	1.11 ± 0.6	1.20 ± 0.6	0.71 ± 0.6**	0.78 ± 0.5 **
Alkaline phosphatase (K.A.U./dl)	16.2 ± 0.7	15.3 ± 0.8	19.4 ± 0.8	20.3 ± 0.6
Ceruloplasmin (I.U./l)	105.5 ± 8.50	111.4 ± 7.50	65.4 ± 6.50 ***	70.3 ± 5.33 ***
Lactic deydrogenase (I.U./l)	239.1 ± 16.5	281.1 ± 20.0	250.5 ± 18.0	290.2 ± 21.0

* P < 0.05   ** P < 0.01   *** P < 0.001

Table (4): Blood picture (mean values ± standard error) of both healthy and alopecic lambs and ewes

Parameters	Healthy sheep		Alopecic sheep	
	Lambs (N = 6)	Ewes (N = 14)	Lambs (N = 28)	Ewes (N = 29)
Haemoglobin (g %)	10.3 ± 0.35	11.0 ± 0.39	8.3 ± 0.40 ***	8.7 ± 0.41 ***
Haematocrit (vol %)	27.9 ± 0.30	31.5 ± 0.46	22.6 ± 0.35 **	26.2 ± 1.08 **
RBCs ($X10^6/\mu l$)	10.1 ± 0.41	11.8 ± 0.33	8.0 ± 0.45 ***	9.9 ± 0.27***
MCV (fl)	27.6 ± 1.70	26.7 ± 2.72	26.1 ± 1.75	25.2 ± 0.90
MCH (pg)	10.20 ± 0.45	9.32 ± 0.40	8.99 ± 0.35 *	8.11 ± 0.38 *
MCHC (%)	36.9 ± 0.80	33.2 ± 0.90	35.8 ± 0.75	32.0 ± 0.89
WBCs ($X10^3/\mu l$)	12.0 ± 0.50	11.2 ± 0.50	15.3 ± 0.50 *	14.1 ± 0.91 *
Segmented neutrophils (%)	22.6 ± 1.90	26.6 ± 1.60	30.3 ± 1.98 **	36.0 ± 1.50 **
Band neutrophils (%)	2.9 ± 0.44	3.0 ± 0.27	3.0 ± 0.50	3.2 ± 0.25
Lymphocytes (%)	68.1 ± 2.70	63.6 ± 2.15	60.1 ± 2.75	53.5 ± 2.10
Eosinophils (%)	1.8 ± 0.37	1.9 ± 0.35	1.9 ± 0.40	2.1 ± 0.40
Monocytes (%)	4.6 ± 0.73	4.9 ± 0.30	4.7 ± 0.63	5.2 ± 0.35

* $P < 0.05$ ** $P < 0.01$ *** $P < 0.001$

Fig. (1): Sheep flock with alopecia.

Fig. (2): Ewe showing alopecia and emaciation.

Fig. (3): Ill thrift lamb showing alopecia and the wool peeled off easily.

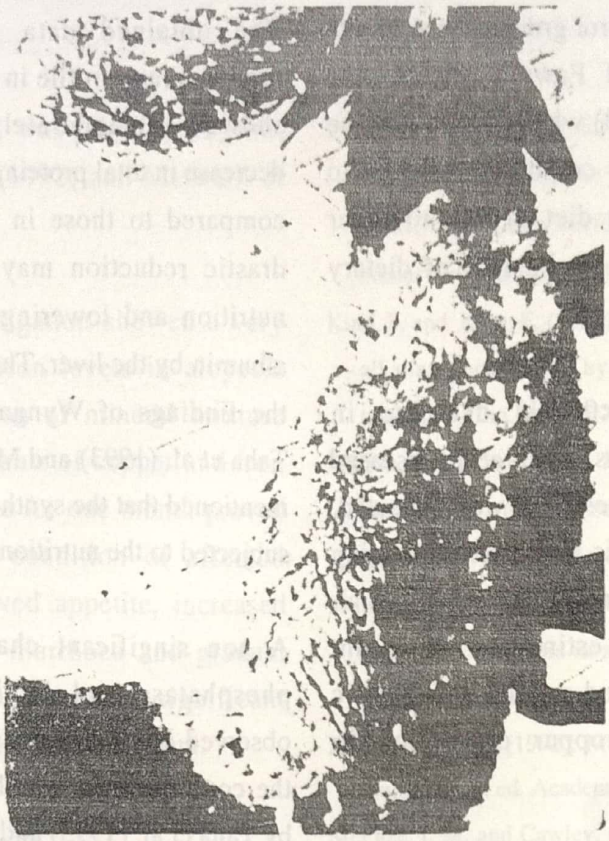

Fig. (4): Lamb after 3 weeks of treatment, the wool growth resumed.

Gradual improvement of the general health condition of affected animals was started after addition of the required trace elements (Fig. 4). Complete healing was noticed after elapse of one month. It was in the form of improved appetite, increased feed intake, disappearance of diarrhoea and alopecia began to subside gradually.

Laboratory findings:

The results of serum biochemical constituents and haematological findings were presented in tables 2, 3 and 4, respectively. Parasitological examination of faecal samples revealed no infestation of the affected cases. Skin scrapings revealed no parasitic or mycotic skin infection of the affected cases.

DISCUSSION

Nutritional diseases are considered one of the important causes of economic losses in sheep (Radostitis et al., 1994). The clinical symptoms recorded in the present study aroused suspicion of copper deficiency in the diseased animals. Even though the clinical findings were consistent with those described by Fawzia et al. (1980); Ismail et al. (1988); Taha et al. (1993) and Metwalli et al. (1997) as arising in disease caused by copper deficiency insheep, they were nevertheless so pathognomonic as to exclude certain other causes. It is clearly evident from the present study that serum copper level is highly significantly ($P<0.001$) decreased in alopecic lambs and ewes

as compared with the control group. These results confirm the findings of Fawzia (1971), and Magda and Hassaen (1993) who reported that the decrease in serum copper could be attributed to inadequae copper in the diet or due to other factors which reduce the availability of dietary copper in the rumen.

Highly significant (P<0.001) decrease in ceruloplasmin activity was osberved in diseased group than in control ones, this was expected, since the ceruloplasmin is a copper containing enzyme. Furthermore, Todd (1970), Ismail et al. (1988) stated that the estimation of serum ceruloplasmin is considered as a high diagnostic tool for tracing the copper deficiency in ruminants.

A highly significant (P<0.001) decrease in serum iron was noticed in alopecic group of lambs and ewes. This result confirms the observations of Fawzia et al. (1980); Schman et al. (1987) and Magda and Hassan (1993) regarding anaemia in copper deficient sheep. During hypocuprosis, there was a decrease in iron level which might be due to the role of copper in the production of haemoglobin through the reutilization of iron liberated from normal breakdown of haemoglobin (Radostitis et al., 1994).

A non significant decrease in serum levels of zinc was recorded in diseased animals as compared to the control group. This is in accordance with the findings of Mandour (1991); Taha et al. (1993) and Metwalli et al.(1997) who found that serum zinc level is not significantly altered in alopecic hypocupremic sheep.

The obtained data concerning the serum proteinogram profile in alopecic lambs and ewes showed a moderately significant (P<0.01) decrease in total protein, albumin and A/G ratio as compared to those in the control group. Such drastic reduction may be attributed to undernutrition and lowering the synthetic power of albumin by the liver. This opinion is supported by the findings of Wyngarden and Smith (1985), Taha et al. (1993) and Metwalli et al. (1997), who mentioned that the synthesis of albumin by liver is subjected to the nutritional state.

A non singificant change in serum alkaline phosphatase and lactic dehydrogenase was observed in alopecic animals when compared to the control group. Similar results were obtained by Taha et al. (1993) and Metwalli et al. (1997).

The erythron of alopecic animals showed a highly significant (P< 0.001) decrease in Hb, PCV and RBCs count in comparison to the control animals. The red cell indices (MCV, MCH and MCHC) revealed microcytic hypochromic anaemia. The red cells of alopecic animals showed anisocytosis, poikilocytosis and polychromasia. This anaemia is reasonable finding in copper and iron deficiency (Underwood, 1977). These results were in agreement to those reported by Magda and Hassan (1993) and Metwalli et al., (1997). The leucon of alopecic animals showed non significnat changes in total and differential leucocytic count..

The clinical signs of alopecia disappeared and the appetite was improved whithin one month of administration of mineral mixture to the concentrated mixture of the flock. The observed

response for treatment was similar to that described by McDowell (1992) and Metwalli et al. (1997).

In conclusion, this investigation showed a very low serum copper and iron levels in alopecic lambs and ewes. Addition of mineral mixture containing adequate amounts of copper and iron to the concentrate mixture for one month proved improvement of health condition of affected lambs and ewes. Improved appetite, increased feed intake, absence of diarrhoea and gradual disappearance of alopecia were a significant reflection to the efficiency of the treatment.

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