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العلاقة بين التسمم بالكبريت وبعض العناصر الموجودة بالمصل  
فى الأغنام والماعز

ثابت ابراهيم ، فوزى شعبان ، سيد العمروسى ، يوسف لبيب ، عبد العزيز شعبان

تم خلال هذه الدراسة فحص ١٦٢ ( مائة واثنين وستين ) حالة من الماعز والأغنام التى ثبت تأثيرها بمخلفات مصنع السوبر فوسفات فى مناطق تقع على أبعاد مختلفة من المصنع وتم تحليل معدل الكالسيوم والماعسيوم العضوى - كذلك نشاط انزيم الفوسفاتيز القلوى ودلت النتائج على وجود انخفاض معنوى فى كل من العناصر سالفة الذكر .



CORRELATION BETWEEN OVINE SULPHUROSIS AND SERUM CALCIUM,  
MAGNESIUM, INORGANIC PHOSPHORUS AND ALKALINE PHOSPHATASE ACTIVITY  
(With One Table & Two Figures)

By

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SUMMARY

During this investigation, 162 sheep and goats were chosen from different areas at various distances far from the super-phosphate factory at Manquabad (Assiut province). Analysis of sheep and goats sera was carried out to determine calcium, inorganic phosphorus, magnesium and alkaline phosphatase activity.

Results showed significant lowering in serum calcium, inorganic phosphorus, magnesium and alkaline phosphatase activity.

INTRODUCTION

Interrelationship between copper, sulphate and molybdenum have been demonstrated long ago, since DICK (1952) reported that the limiting effect of molybdenum in copper nutrition of sheep depended upon sulfate level of the ration. It had been reported also that sulphate lowers the availability of calcium in poultry (PENSACK *et al.*, 1964) and lambs (GOODRICH and TILLMAN, 1966 a) through the formation of insoluble calcium sulfide in the gastrointestinal tract. GOODRICH and TILLMAN (1966 b) also reported that phosphorus retention was significantly reduced by sulphate in lambs fed on a ration containing sulphate ions.

The study reported herein was conducted to study the interrelationship of industrial ovine sulphurosis and the level of calcium, magnesium, inorganic phosphorus and alkaline phosphatase enzyme in sheep and goats suffering from sulphate intoxication (SHAABAN *et al.*, 1980) as a result of the emission of  $SO_2$ ,  $H_2S$  and  $SO_3$  from super-phosphate factory at Manquabad (Assiut Province).

MATERIALS AND METHODS

Blood was obtained by jugular vein puncture from 162 animals, with (66 animals) - or without (95 animals) - clinical signs from different localities (Table 1) in the vicinity of super-phosphate factory. Control samples were obtained from 22 healthy sheep without any clinical symptoms, from an area 18 km. far from the factory. Serum calcium was determined by BETT and FRASER method (1959), magnesium by the method described by NEIL & NEELY (1956) and both inorganic phosphorus and alkaline phosphatase by KILCHLING and FREIBURG method (1951).

Data obtained were statistically calculated according to KALTON (1967).

RESULTS

Analysis of serum calcium, inorganic phosphorus, magnesium and alkaline phosphatase activity revealed significant lowered levels (at  $P/0.01$ ) in animals with or without clinical signs of intoxication at El-Gazira, and El-Tawabiya comparatively with high sulphur estimation. In Ilwan's animals showing clinical signs, and Manquabad animals without clinical signs the same results were obtained. Results of these observation, are listed in (Fig.1 and 2).

DISCUSSION

A highly significant lowering in serum phosphorus level was observed in animals with high concentration ( $P/0.01$ ) of serum and wool sulphur accompanied by low levels of serum and wool copper (SHAABAN *et al.*, 1980).

In this respect copper is considered to be very essential for proper phosphorus metabolism (SHIRLEY *et al.*, 1951). It is suggested that factors which lower copper levels indirectly produce hypo-phosphataemia. One of these

factors is the increased level of sulphate intake specially when the diet contain normal or low level of copper and molybdenum. The obtained results appear, therefore, to agree with those of SHIRLEY *et al.* (1950, 1951) and GOODRICH and TILLMAN (1966 a).

The relationship between alkaline phosphatase activity and serum inorganic phosphorus is evidenced in this investigation which revealed that each one goes, nearly side by side with the other. Such relationship was previously discussed by DAVIS and HANNAN (1947) in cattle.

In exposed areas, at El-Gazira and El-Tawabiya, the majority of animals had relatively lower levels of calcium which reached 7.85 mg%. The formation of calcium sulphide may explain such behaviour. Our results are in agreement with GOODRICH and TILMAN (1966 b) in that sulphate lowers the availability of calcium due to possible formation of calcium sulphide.

## REFERENCES

- Bett, I.M. and Fraser, C.P. (1959): Determination of calcium in serum. *Clin. Chem, Acta.*, 4, 364.
- Davis, G.K. and Hannan, H.(1947): Copper metabolism with relation to alkaline blood phosphatase and blood ascorbic acid. *J. Animal Sc.*, 6, 484.
- Dick, A.T. (1952): The effect of diet and molybdenum on copper metabolism in sheep. *Aust. Vet. J.*, 28, 30.
- Goodrich, R.D. and Tillman, A.D. (1966 a): Copper, sulphate and molybdenum interrelationships in sheep. *J.Nutri.*, 90, 76.
- Goodrich, R.D. and Tillman, A.D.(1966 b): Effect of sulphur and nitrogen sources and copper levels on the metabolism of certain minerals by sheep. *J. Animal Sci.*, 25, 484.
- Kalton, G. (1967): "Introduction to statistical ideas from social scientists". 2nd. Ed. Acad. Press (London).
- Kilchling, H., and Freiburg, Br. (1951): "Inorganic phosphorus in serum and alkaline phosphatase in serum". In: *Clin. photometric.* 3rd. Ed. 1951. Wiss, Verlag in BH, Stuttgart.
- Neil, D.W. and Neely, R.A. (1956): *J. Clin. Pathol.*, 9, 169. Cited by Oser, B.L. (1965): *Hawk's physiological chemistry.* 14th. Ed. Blakiston, Division, Mcjrew. Hill Book Company. New York Toronto, Sydney, London.
- Shaaban, F.E., Amrousi, S.A., Shaaban, A. and Abdel Monhim, T.I. (1980): Occurrence and effect of industrial sulphurosis. *Assiut Vet. J.* under publication in Egypt.
- Shirley, R.L., Owens, R.D. and Davis, G.K. (1950): Deposition and alimentary excretion of phosphorus-32 in steers on high molybdenum and copper diets. *J; Animal Sci.*, 9, 552.
- Shirley, R.L., Owens, R.D. and Davis, G.K. (1951): Alimentary excretion of phosphorus-23 in rats on high molybdenum and copper diets. *J..Nute.*, 44, 595.
- Pensack, J.M., Kantor, S., Gale, G.O., Shor, A.L., Ginher, P.E. and Skaeer, L.M. (1964): Aureomycin program for starting chickens. *Tech. Bul. 22. American Cyanamide Company. Princeton, New Jersey.*

TABLE (1)

Localities chosen, and number of animals used during investigating the effect of environmental sulphur pollution in sheep.

Areas	Distance from factory (K.m)	Serum sulphur (mg/100 ml.)	Number of Animals	Animals with a clinical signs		Animals Without clinical signs	
				Male	Female	Male	Female
1. El-Gazira	adjacent to	1075.00±26.48	28	6	18	1	3
A) Gaziret El-Alkrad	the factory						
B) Ezbet-Mohamed	1.5		30	-	13	-	23
2. El-Tawabiya	0.75	1259.00±67.11	40	-	17	2	21
3. Manqabad	1.00	392.51±68.80	11	-	-	-	11
4. Ilwan	1.75	851.68±87.74	47	-	21	3	32
Total			162	6	60	6	90

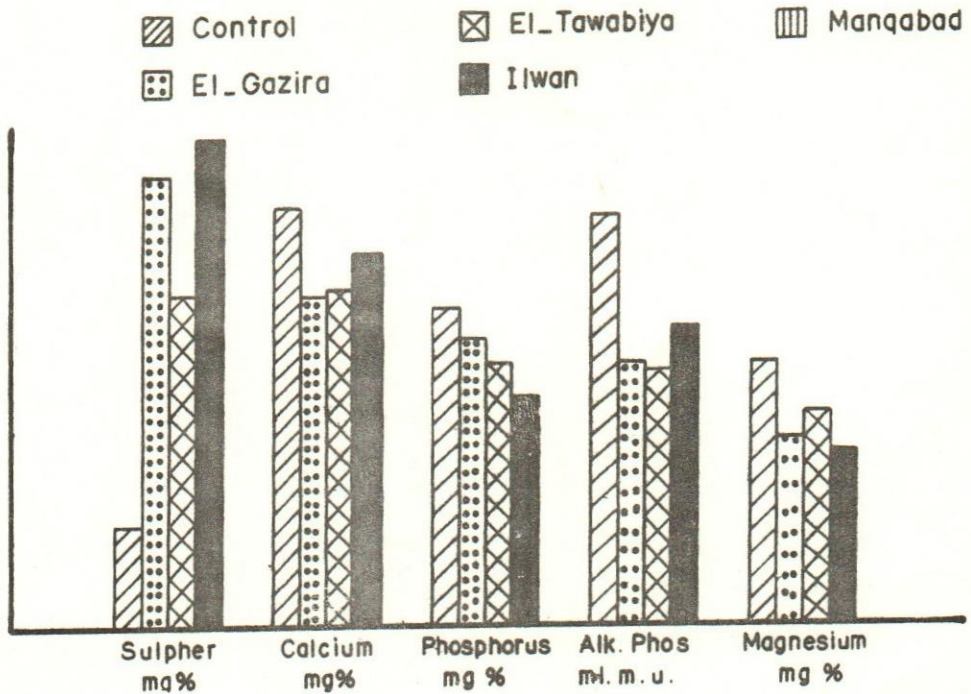


Fig. (1): Sulphur, Calcium, Phosphorus, Alk. Phosphatase activity and Magnesium levels (mg %) in serum of tested animals showing clinical signs.

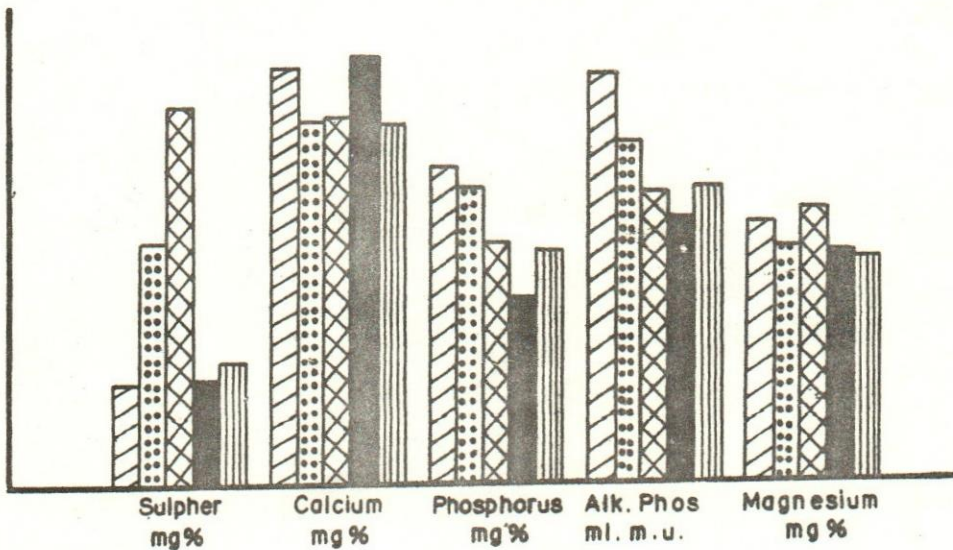


Fig. (2): Sulphur, Calcium, Phosphorus, Alk. Phosphatase activity and Magnesium levels (mg %) in serum of tested animals showing clinical signs observed.

