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**SOME ELEMENTAL STATUS IN RELATION TO FLUORIDE
IN BUFFALOES SUFFERING FROM CHRONIC FLUOROSIS
AT ASSIUT PROVINCE**
(With 1 Table and 2 Figures)

By

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دراسة مستويات بعض العناصر في مصل الدم وعلاقتها بنسبة الفلوريد أثناء التسمم المزمن للجاموس في محافظة أسيوط

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درست مستويات بعض العناصر في مصل دم الجاموس وعلاقتها بنسبة الفلوريد أثناء التسمم المزمن لعدد ٥٠ جاموس في منطقة منقباد بمحافظة أسيوط تراوحت أعمارها بين ٥ - ٨ سنوات . وقد إتضح من الدراسة مايلي : ١ - وجود إرتباط عالب بين نسبة الفلوريد في مصل دم الحيوانات المصابة ومستوى عناصر الكالسيوم ، الماغنسيوم ، الحديد ، الصوديوم والكلوريد ٢٠ - وجود إرتباط موجب بين نسبة الفلوريد ومستوى البوتاسيوم في مصل دم الحيوانات المصابة أيضاً . وتبين من البحث أنه يجب أن تؤخذ في الإعتبار مستويات هذه العناصر أثناء عملية التشخيص والعلاج .

SUMMARY

Correlation between fluoride level and some blood serum elemental status were studied in 50 buffaloes suffering from chronic fluorosis at Manqabad district, Assiut Province. Age of examined animals ranged between 5-8 years.

The study revealed negative correlation between fluoride and levels of Ca, Mg, Fe, Na and Cl. Positive correlation between fluoride and K level was also evident. Such elemental status during treatment of buffaloes suffering from chronic fluorosis may be considered.

INTRODUCTION

Among environmental contamination problems is industrial fluorosis, which occupy a prominent position.

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Industrial fluorosis have been studied, at different countries. In Denmark (ROHLM, 1934); Italy (BARDELLI and MENZANI, 1973); England (TOWERS, 1954); Germany (ROSENBERGER and GRÜNDER, 1967); USA (CRISSMAN *et al.*, 1980); Egypt (ABD EL-ALL, 1983; KARRAM, 1982 and IBRAHIM, 1983).

Very limited information is available on the antagonistic and the synergistic effects of different elements and compounds in relation to fluoride.

The aim of the present work is to study picture of some elements in relation to fluoride in buffaloes suffering chronic fluorosis.

MATERIAL and METHODS

Material :

A total number of 50 buffaloes (5-8 years) of native breed were examined in the present study. The animals were selected from different areas around Manqabad Superphosphate Factory (Fig. 1) Assiut Governorate. Environmental Pollution from the factory byproducts specially fluorine compounds was previously noticed in other species by the clinicians in the Veterinary Clinic, Assiut. The animals under investigation revealed that 28 buffaloes showed clinical signs of chronic fluorine intoxication.

Methods :

Blood samples were collected from intoxicated individual. Non haemolysed serum samples were used for determination of fluoride level (p.p.m) by aid of the method described by FRAY and TAVES (1970); Serum calcium (mg%) was estimated by the method of CONNERTY and BRINGS (966) using test kits supplied by Stanbio Laboratory Inc. U.S.A.

Serum magnesium (mg/L) and serum iron (Ug%) were determined using test kits of BioMerieux (Bain/France) and according to methods of GINDLER *et al.* (1971) and PICCARDI *et al.* (1972) respectively. Serum sodium and potassium were measured by means of Corning flame photometer 400. Serum chloride was determined by Corning chloride-meter 925.

Statistical analysis of the obtained data were carried out according to the methods given by SNEDECOR and COCHRAN (1974), with the aid of Fugi Tech. Computer, Statistical Dept. Fac. of Agric. Assiut Univesity.

RESULTS

Correlation between fluoride level, calcium, magnesium, Iron, sodium, potassium and chloride in serum of buffaloes suffering from chronic fluorosis was recorded in table (1) and Fig. (2).

SCALE 1:100 000

خريطة منطقة منقباد

مقياس الرسم 1:100000

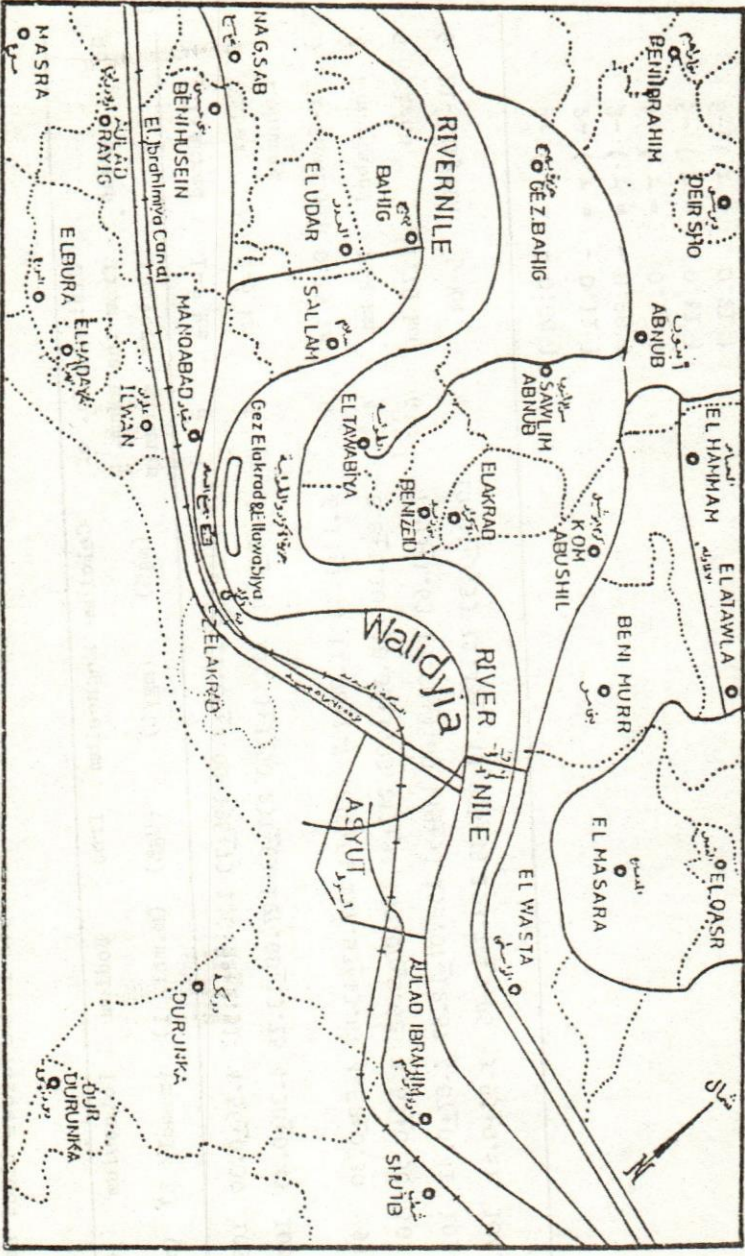


FIG.1 TOPOGRAPHY OF MANQABAD DISTRICT

CHRONIC FLUOROSIS

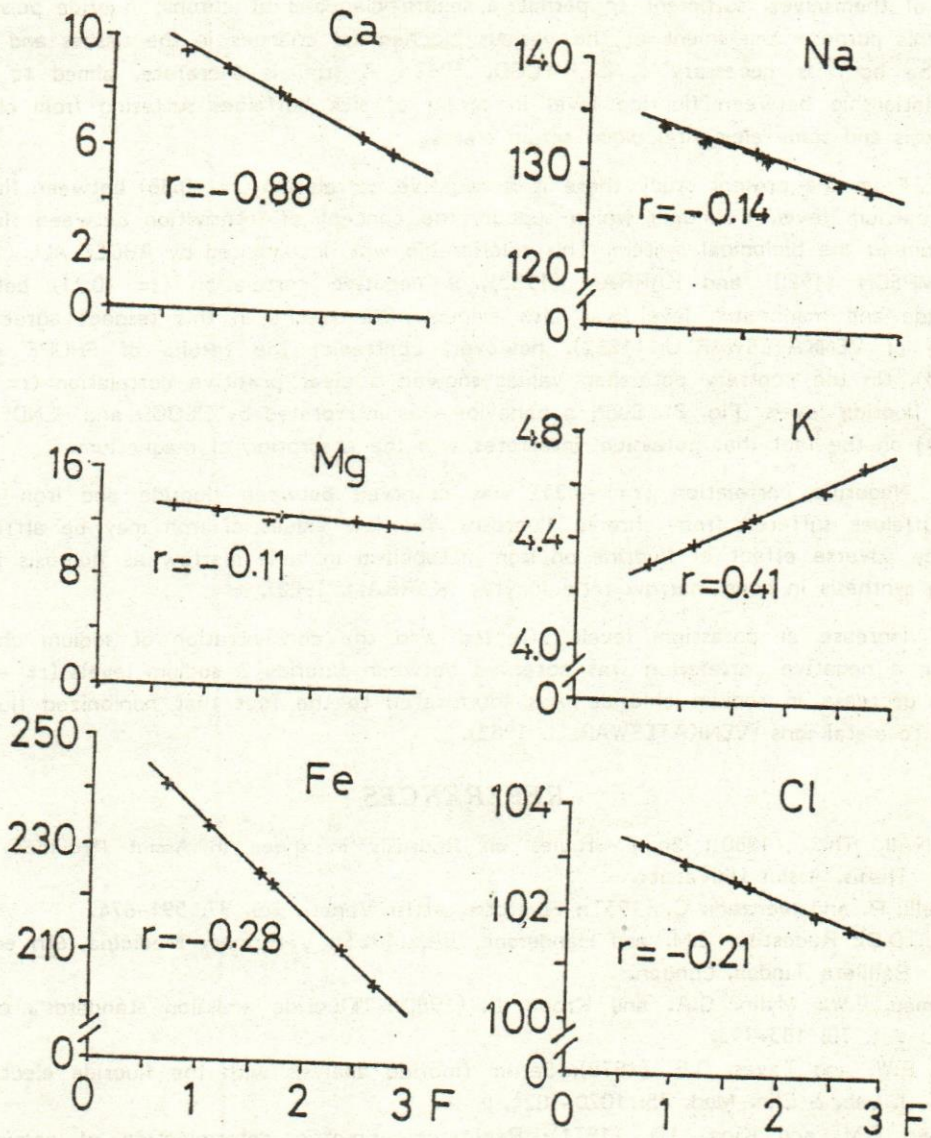


Fig. (2): Correlation between Fluoride level and some Elemental Status in Buffaloes suffering from Chronic Fluorosis .

DISCUSSION

It is fairly known that neither the clinical signs nor the histopathological changes are, of themselves, sufficient to permit a secure diagnosis of chronic fluoride poisoning, for this purpose assessment of the various biochemical changes in the tissues and fluids of the body is necessary (UNDERWOOD, 1962). A trial is therefore, aimed to clear a relationship between fluoride level in serum of sick buffaloes suffering from chronic fluorosis and some elemental blood serum status.

From the present study there is a negative correlation ($r = -0.88$) between fluoride and calcium level, a finding which supports the concept of interaction between fluoride and calcium in the biological system. This relationship was documented by ABDEL ALL (1980); THOMPSON (1980) and KARRAM (1982). A negative correlation ($r = -0.11$) between fluoride and magnesium level was also evident. Our results in this respect agree with those of VENKATESWARLU (1982), however, contradict the results of SHUPE *et al.* (1963). On the contrary potassium values showed a clear positive correlation ($r = 0.41$) with fluoride levels (Fig. 2). Such a behavior was interpreted by BLOOD and HENDERSON (1974) on the fact that potassium interferes with the absorption of magnesium.

Negative correlation ($r = -0.23$) was observed between fluoride and iron status in buffaloes suffering from chronic fluorosis. The low values of iron may be attributed to the adverse effect of fluorine on iron metabolism in bone marrow as fluorosis inhibits heme synthesis in bone marrow reticulocytes (KARRAM, 1982).

Increase of potassium levels affected also the concentration of sodium chloride where a negative correlation was observed between fluoride & sodium levels ($r = -0.41$). Such decrease in sodium chloride was interpreted to the fact that nonionized fluoride, bonds to metal ions (VENKATESWARLU, 1982).

REFERENCES

- Abdel-All, Th.S. (1980): Some studies on fluorosis in sheep in Assiut Province. M.V. Thesis, Assiut University.
- Bardelli, P. and Menzani, C. (1937): Fluorosis. *Atti Veneto Sci.* 97: 591-674.
- Blood, D.C.; Radostits, O.M. and Henderson, J.A. (1983): *Veterinary Medicine*, 6th edition. Bailliere Tindall, London.
- Crissman, J.W.; Mylin, G.A. and Krook, L. (1980): "Fluoride emission standards". *Cornell Vet.* 70: 183-192.
- Fray, R.W. and Taves, D.R. (1970): Serum fluoride analysis with the fluoride electrodes. *J. Lab. & Clin. Med.* 75: 1020-1024.
- Gindler, E.M. and King, J.D. (1971): Rapid colourimetric determination of calcium in biologic fluoride with methylthymol blue. *Am. J. Clin. Path.* 58: 376-382.
- Ibrahim, Th.A. (1983): Toxicological effects of the byproduct of the super phosphate plant on the Egyptian buffaloes in Assiut Province. Ph.D. Thesis, Assiut University.

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- Karram, M.H. (1982): Studies on fluorosis in goats in Assiut Province. Ph.D. Thesis, Fac. of Vet. Med. Assiut University.
- Connerty, H.V. and Brings, A.R. (1966): Quantitative colorimetric determination of total calcium in serum. *Am. J. Clin. Path.* 45: 290.
- Piccardi, G.; Nyssen, M.; Dorche, J. (1972): Colorimetric method for iron determination. *Clin. Chem. Acta*, 40, 219.
- Rohlm, D. (1934): Fluorosis *Arch. Wiss. Prakt. tierheilk*, 67, 420.
- Rosenburger, G. and Gründer, A.D. (1967): Chronic fluorosis in cows possible harmful on their calves. *Berl. Münch. Tierärztl. Wsch.* 80: 40-41.
- Shupe, J.L.; Miner, M.L.; Harris, L.E. and Greenwood, D.A. (1963): Relative effects of feeding hay atmospherically contaminated by fluorine residue, normal hay plus calcium fluoride and normal hay plus sodium fluoride to dairy heifers. *Am. J. Vet. Res.*, 23, 777-787.
- Snedecor, G.W. and Cochran, W.G. (1974): *Statistical Methods*. 6th Ed. Iowa State Univ. Press. Ames, Iowa, U.S.A.
- Thomposon, D.J. (1980): Industrial consideration related to fluoride toxicity. *J. An. Sci.* 51, 767.
- Towers, R.G. (1954): Chronic fluorine poisoning associated with industry. *Veterinary Record*. 66: 355-358.
- Underwood, E.J. (1962): "Trace elements in human and animal nutrition" 2nd edition Academic Press INC. New York and London.
- Venkateswarlu, P. (1982): Overview of analytical methods for fluorine in air, water, soil, vegetation, body fluids and tissues. Proceedings of an International Symposium on Fluorosis, Utah State University Logan, Utah, U.S.A.