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STUDIES ON THE ENZOOTIC ATAXIA IN LAMBS IN TURKEY

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ABSTRACT

Since 1961 several research workers carried out different types of works on the Enzootic ataxia in lambs in Turkey, such as: investigations of macroscopic and microscopic appearences of the disease,clinical findings, determination of copper concentration in soil, plants, and blood plasma, liver and brain and the possibility of curing the disease by copper compounds. These works couldn't make whether the etiology of the disease is a primary or secondary copper deficiency. Regarding the importance of the factor (or factors) affecting on the disease more works should be carried on on the Enzootic ataxia in lambs in Turkey.

ÖZET

Birçok araştırıcı 1961 den beri Türkiye'de kuzularda seyreden Enzootic ataxia (çarpık) hastalığı üzerinde çeşitli bilimsel çalışmalar yapmışlardır. Bunlar arasında hastalığın makroskopik ve mikroskopik görünüşleri, klinik bulgular, toprak, bitki, plasma karaciğer ve beyinde bakır konsantrasyonlarının tayini ve bakır tuzları vererek hastalığın tedavisi yer almaktadır. Bu çalışmalar hastalığın pirimer ya da sekonder bir bakır yetmezliğinden ileri gelip gelmediğini açıklamaya yetmemektedir. Etyolojik faktörün önemini dikkate alarak Türkiye'de kuzularda Enzootic ataxia üzerinde bazı çalışmaların yapılması gereklidir.

INTRODUCTION

Enzootic ataxia (swayback), a nervous disorder of lambs is very common all over the world. In 1937, Bennetts an Chapman [1] showed that the ataxia of lambs occurring in Western Australia was associated with subnormal levels of copper in the pastures and in the tissues of both ewes and affected lambs. In some conditions, the incidence of ataxia could not be explained in terms of a simple dietary deficiency of copper [2 - 6] and be attributed to a «conditioned» copper deficiency brought about by the existence of other factors in the environment affecting copper utilization or distribution in animals [7] such as antagonism of copper with molibdeneum and sulphate in the organism.

The disease in Turkey was first recognized in 1961, since then several Turkish research workers have been working on the disease. A short review of these studies is given.

STUDIES

Enzootic ataxia (Swayback), a very common disease found in lambs all over the world, was first time reported in 1961 by Özcan in the Black Sea part of Turkey (Samsun) where there is a state farm by the sea. In his report [8], which was submitted to the Turkish Ministry of Agriculture, he was uncertain about the disease, but said that it could be Enzootic ataxia and that there was a possibility of curing it by giving copper salts.

Karagözoğlu [9] investigated the outbreaks of the disease in the farms around the state farm and confirmed that the death rate of the lambs during lambing time was from 10 % to 70 % . According to Karagözoğlu the outbreak of the disease in that area might have started at least ten years before it was diagnosed. Farmers call the diseased lambs «ÇARPIK» which express paralysis. He found Hydrocephalia Interna Acquisita in lambs dying in ten days after parturition.

Urman [10] divides microscopic investigations into four groups : i) Brains with normal appearence; ii) Brains containing large cavitations, the white matter being replaced by a clear fluid; iii) Brains which were shrunken and failed to fill the cranium. Gelatinous lesions of white matter were prominent. The space between the shrunken brain and the cranium was filled with cerebral fluid; and iv) Brains with a swollen appearence associated with cerebellar deformity and herniation. In microscopic investigation he found demyelination of the white matter of the cerebrum, chromatolysis and necrosis of the spinal cord, severe degeneration of nerve cells in the red nucleus and less in the dentate fastigeal, fascial and trigeminal nuclei. Urman claims that the disease appears in «congenital» and «delayed» forms. In the «delayed» form he observed retardation of growth and increased fragility of bone, and distrophic bands of depigmentation or apigmentation, and lack of crimps in the black woolled lambs.

Baysu [11] analysed the whole blood of lambs with suspected Enzootic ataxia and for the first time in Turkey, proved that the concentration of copper in them is lower than in normal lambs.

Kehrer [12] analysed the copper content of soil, plant and blood samples taken from Samsun and Çivril - Denizli (Denizli is in the west part of Turkey). He found that most of the tested soil from Samsun contained a high amount of copper, from 5.6 to 16.3 mg to one kg of air dried soil, whereas the soil from Çivril contained 0.1 to 0.4 mg copper, a very low amount of copper available for use by plants. The average amount of copper in the analysed samples from the grazing areas of Samsun was 13.5 ∓ 3.7 mg, and from Çivril it was 14.8 ∓ 5.4 mg of copper per kg of dry matter. He says that lambs with Enzootic ataxia, and their

mothers, exhibit a lower copper content in their blood than the healthy animals, and claims that with the restricted digestibility of low quality hay and the high amount of calcium (1.2—4.0 %) and molybdeneum (20 - 30 mg/kg dry matter, with their negative influence on copper resorption and retention, the utilization of copper is greatly reduced.

Urman et al [13] carried out further extensive work in Samsun, including analysis of pasture trace elements influence of pregnancy and pasture rotation on blood serum copper concentration, and investigation of the pathological features of the disease. They claim that the condition observed in the area is not a «simple copper deficiency» problem and consider the herbage copper concentration analysed in fourteen areas to be adequate for the health of the sheep. Also the molibdeneum values found appearing in the normal range, between 0.19—1.79 ppm D.M.. The total sulphate content in the same herbage samples are considered by them to be in the no mal range.

Özcan et al [14] tried to cure «the delayed» form of Enzootic ataxic lambs by injecting $CuSO_4.5\,H_2O$ and Hyaluronidase subcutaneously. The area was in interior Anatolia, the district of Konya. They found the serum copper level of the diseased lambs to be lower than in normal lambs. After 30 days of the treatment the serum copper level increased to a normal level. Recovery was not complete in the treated lambs but growth and feed intake were rather good.

Şendil [16, 17, 18] has done very extensive work on the profilactic effect of different levels of different copper compounds in Samsun districts. He found an increase in the serum copper concentration where the doses of copper concentration given were high. But for the prevention of the disease 30 ml 1 % $CuSO_4$ solution must be given to the sheep at least four times in a pregnancy period. If it was given five times none of the lambs show the ataxic condition at all. According to Şendil sheep in the experimental group which were given subcutaneous injections of «Coprin» (50 mg copper) never developed any clinical syndrome and none of the offspring showed the ataxic condition, whereas the incidence was 63.63% in the control group. He found the incidence of the disease to be 1.62% in the offspring of the 2 ml DMSO «Dolicur» (120 mg $CuSo_4.\,5H_20$ equivalent of 30.54 mg copper) injected group, and 2.5 % in the «Hyaluronidase» (2 ml of 0.9 % NaCl containing 120 mg $CuSO_4.\,5H_20$ and 100 units of hyaluronidase) injected group. He claims that the best way to prevent Enzootic ataxia in sheep is to inject copper compounds once a year subcutaneously, rather than to give them orally. In the control group of animals he found that erythrocyte number, hemoglobin and hemotocrit levels were within the normal ranges both in the middle and in the advanced periods of gestation.

Şendil et al [19, 20] repeated the study of the profilactic effect of copper compounds on the Enzootic ataxia in Samsun, and they obtained results similar to the previous studies carried out by Şendil [16]. They found correlation between the incidence of Enzootic ataxia and the level of serum copper of the sheep treated with copper compounds. The level of serum copper was dropped to 37.30∓3.84 µg/100 ml. in the late prengnancy of the control animals, whereas they found increase in serum copper level of sheep receiving oral copper compounds in 30 days but they noticed the increase in serum copper level was remarkably high in sheep receiving injections of the mixtures containing DMSO and Hyaluronidase. They haven't seen any toxic effect of the copper compounds related with the injection sites apart from the slight local reactions. The incidence of the disease looks very high according to Şendil et al [20]. They reported 60 % incidence of the Enzootic ataxia in the control group and met very few ataxic offspring of sheep receiving copper compounds. The incidence of the disease were recorded 40—80 % in Sinop and 3—10 % in Ordu, the provinces lying by the cost of Black Sea, 10—30 % in and around Denizli. Şendil [21] found increase on the live weights of sheep receiving copper compounds as well.

Urman et al have been carrying out some works on the Enzootic ataxia including determination of the whole-blood, liver, and brain copper concentration and electronmicroscopic appearences of the brains of the diseased lambs. In the samples of diseased lambs low copper concentrations were found but these studies have not been completed yet.

CONCLUSION

The studies carried out on the Enzootic ataxia until now could not make clear wheter the disease caused by a primary or secondary copper deficiency in lambs in Turkey. Regarding these aspects it was decided to carry out a cooperative work on the copper deficiency in Samsun, in 1974. The determination of blood, liver and brain copper concentration of the diseased lambs gave the same results e. g. low copper concentration. The determination of soil and plant copper and other mineral status in the diseased and in the normal areas is going to be carried out. It was collected quite a lot of samples from the areas but analysis have not been completed yet. We think that the trace mineral status of plants in those areas wil help us to distinguish the etiologic factor (or factors) of the E. ataxia in lambs, the outbreaks of which occur every year, causing so much economic loses. In the mean time the types of hemoglobin and concentration of ceruloplasmin of the sheep plasma which have E. ataxia in their offspring will be determined during lambing time in 1977. Obviously this research based on the knowledge that the different

levels of copper concentrations are found in sheep with different types of hemoglobin, and it was sugested by Prof. Dr. Moustgaard from the Veterinary and Agricultural University of Copenhagen, who was in Ankara in April, 1976, as an expert of the IAEA. He has promised to help in this study.

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