

THE ETIOLOGY OF "UROVSKAYA" (KASHIN - BEK'S) DISEASE

N. I. Muchkin

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The alimentary-mycotoxic theory of causation of "Urovskaya" (Kashin-Bek's) disease was tested in experiments on rabbits. After the animals had been fed for 4 months on the alkaloid berberine, they developed a series of characteristic signs of "Urovskaya" disease. However, to reproduce the complete clinical picture of the disease, other conditions are also evidently necessary.

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"Urovskaya" (Kashin - Bek's) disease is an endemic disease mainly affecting the bones and joints. In the USSR this disease is found in Chita and Amur Regions. The etiology of "Urovskaya" disease has been studied for a long time. Various theories have been put forward to account for it: infective [1], thyrogenic [7], water-born [2], a theory explaining the disease by an increased concentration of various minerals and organic substances in the water [8], a geobiochemical theory [3, 4], etc.

F. P. Sergievskii [5] proposed an alimentary-toxic theory. In his opinion, the disease is caused by a toxin present in cereals grown in local fields. He confirmed his theory by showing the relationship between incidence of the disease and consumption of imported or local bread, and also on the incidence of fungus diseases among the grain. L. I. Sergievskaya [6] considers that this toxin is the alkaloid berberine, present in certain plants (moon-seed, berberis, and Palas' spurge), growing around fields with crops. Fungi, which to begin with are parasitic on these plants, receive this alkaloid from them and when they migrate to cereal plants, they transfer this property to them.

The object of this investigation was to study clinical, laboratory, histological, and radiological changes in experimental animals after prolonged administration of Palas' spurge.

EXPERIMENTAL METHOD

The experiment was carried out for 4 months on 18 young rabbits. Animals were divided into two groups: group 1, control; group 2, experimental. The rabbits of group 2 received the root of Palas' spurge in the form of a powder in a daily dose of 0.5 g per animal; otherwise the animals received the same diet.

All the animals were weighed before the experiment, blood was taken for analysis, and roentgenograms taken of the limb bones. Subsequently the blood was examined and roentgenograms taken of the bones every month and the animals were weighed every 15 days.

EXPERIMENTAL RESULTS

The mean increase in weight in both groups during the experiments was 1068 g (859 and 1927 g), the values for the separate groups being 1337 g (866 and 2203 g) for group 1 and 798 g (853 and 1451 g) for group 2. Retardation of the rabbits of the experimental group as regards gain in weight was approximately equal throughout the experiment.

At the end of the experiment, the experimental animals appeared lethargic, drowsy, and emaciated. At the periodic clinical examinations no sharp changes were found in the bones and joints characteristic of "Urovskaya" disease (contractures, deformities). No significant difference was found in the number of erythrocytes and leukocytes, or the percentages of individual types of leukocytes between the control and experimental groups (Table 1), although the serum inorganic phosphorus concentration in the experimental animals was only half that in the controls (Table 2).

Research Laboratory for the Study of "Urovskaya" Disease, Chita Medical Institute (Presented by Active Member of the Academy of Medical Sciences of the USSR S. R. Mardashev). Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 66, No. 10, pp. 31-33, October, 1968. Original article submitted November 14, 1967.

TABLE 1. Characteristics of Rabbits' Blood

Group	Hemoglo- bin conc. (in g%)	Number of		Differential count (in %)					
		erythrocytes	leukocytes	bas.	eos.	lymph	neutrophils		
							juv.	stab.	seg.
Before experiment									
Control	10.9±0.25	5,100,000±75,000	6100±340	0.4±0.1	4±0.35	71±3	—	5±1.5	16±2.2
Experi- mental	11.1±0.32	5,150,000±120,000	5900±200	0.7±0.3	5±0.40	69±2.6	—	6±1.8	17±3.1
After experiment									
Control	10.8±0.3	5,200,000±125,000	6400±210	0.5±0.2	3±0.15	70.0±1.5	—	6±2.0	15±1.8
Experi- mental	10.6±0.25	4,900,000±	7000±180	0.5±0.2	3±0.20	72±2.1	—	5±0.61	16±2.6

TABLE 2. Concentration (in mg%) of Total Calcium and Inorganic Phosphorus in Blood Serum of Rabbits

Group	Phosphorus	Calcium
At beginning of experiment		
Control	3.3±0.22	13.8±0.3
Experimental	3.1±0.19	14.2±0.45
At end of experiment		
Control	3.2±0.21	14.1±0.42
Experimental	1.8±0.24	12.9±0.35

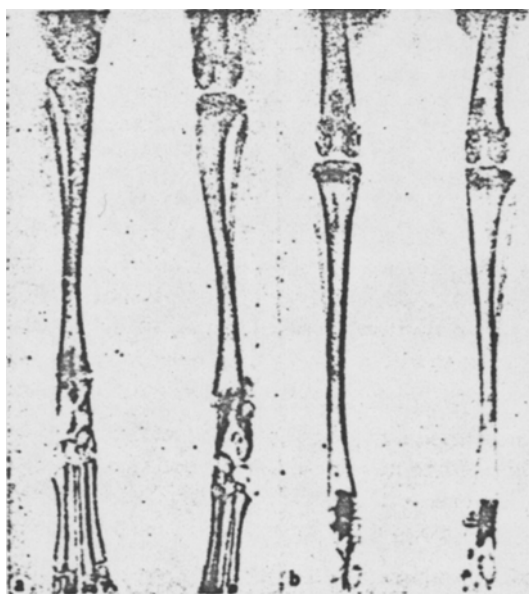


Fig. 1. Roentgenograms of limb bones of rabbits of experimental (a) and control (b) groups at end of experiment.

In roentgenograms of some rabbits of the experimental group taken at the end of the experiment, an ill-defined focal osteoporosis, accompanied by sclerosis and earlier fusion of the epiphysis to the metaphysis were found (Fig. 1).

At necropsy on some of the experimental animals' areas of necrosis and degeneration were found in the liver and kidneys, with thinning and loosening of the fibrous structure of the articular cartilage on some articular surfaces of the limbs. Histological examination revealed foci of dry necrosis in the bone tissue of the epiphyses, a zigzag-shaped zone of growth, hyalinosis of the blood-vessel walls in the bone tissue, necrosis and sloughing of areas of cartilage tissue, and metaplasia of cartilage into fibrous tissue.

Prolonged administration of the root of Pallas' spurge to the animals thus caused the development of a number of characteristic signs of "Urovskaya" disease: marked retardation in growth and development, sclerosis and earlier fusion of the epiphysis with the metaphysis, thinning of the articular cartilage, and degenerative processes in cartilage and bone tissue. However, other conditions are also necessary for production of the complete clinical, laboratory, radiological, and histological picture of "Urovskaya" disease.

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