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METABOLIC CHANGES IN TOXIC LIVER DAMAGE AND THE POSSIBILITY OF THEIR CORRECTION

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Purpose of research - therefore, the aim of this study was to study the effect of the combination of antioxidants of sodium selenite and vitamin E on the indicants of physical development during chronic intoxication with magnesium chlorate in the prepubertal period.

Material and methods. Researches were conducted on 30 white rats of 21 days of age, the age of which was strictly observed from the day of their birth. Indicators of physical development were weight, body and tail length, height constant, and animal surface area. Body weight was measured using weights daily and expressed in grams. Other indicators of the physiological development of animals were determined 3 times during the experiment: at the beginning of the experiment (21 days of age), one day after the last injection of magnesium chlorate (42 days of age) and after completion of treatment (63 days of age).

Results. The use of antioxidants leads not only to the normalization of liver parameters, but also to the normalization of physiological growth indicators, contributing to the full development of the young body. The most effective therapeutically was a combination of antioxidants

Conclusions. Thus, based on the foregoing, it can be concluded that in case of chronic intoxication of magnesium chlorate in the prepubertal period, the use of antioxidants, especially in combination, helps to restore the damaged structures and functions of the liver, which is the main reason for the normalization of the



indicators and physiological development of the growing organism, viz these indicators increased: mass by 98,7%, body length by 100,6%, tail length by 100,7%, growth constant by 78,1%, area surface increased by 99, 1%.

Keywords: *pesticide, antioxidants, sodium selenite, vitamin E, toxic hepatitis, prepubertal period.*

The use of biological stimulants, mineral fertilizers and pesticides in order to increase the yield and quality of agricultural plants is considered highly effective, which explains the increase in volume and quantity, as well as the widespread use of such chemical compounds, one of which is organochlorine pesticide - magnesium chlorate.

Since 1958, magnesium chlorate has been produced and is widely used in agriculture for the purpose of defoliation and desiccation [8, 21]. Due to such widespread use, the interest of scientists of the world has increased to the magnesium chlorate and they have begun deeply study its effect on the environment, and especially on a living organism.

As a result of research, scientists noted that, violation of the norms and rules of ecological hygiene during the production, use and storage of magnesium chlorate leads to environmental pollution - the substance becomes a factor negatively affecting the body [2]. As indicated in modern literature, chlorine-containing pesticides getting into the body cause disturbances not only in adults, but also in a young, growing body. It is known that prolonged intake of even small doses of toxic chemicals into the body can cause negative changes in the metabolic processes of the body. In this plan, organochlorine pesticide - magnesium chlorate, widely used in agriculture, in case of violation of environmental standards and the rules for its use, while getting into the body and being a chemically active substance, causes a number of functional and morphological changes in various



organs, in particular in the liver [8]. The liver of a young, growing organism is especially sensitive to such a toxic effects, since it is still functionally very labile and structurally underdeveloped [13]. Toxic liver damage can significantly affect the physical development of a growing organism, since the main metabolic processes that ensure physical development occur in the liver [3, 5, 13]. The development of rational methods for the medicamental treatment of metabolic disorders in diseases of the liver of a growing organism, as well as their pharmacological correction is an urgent problem.

Available literature data show the significant importance of antioxidant compounds in the correction of various pathological conditions [4, 6, 11, 14, 15, 17, 18].

However, researches dedicated on studies the effect of antioxidants on indicants of physiological development in chronic toxic liver damage with magnesium chlorate in the prepubertal period are absent, which was the basis for the present study. Therefore, the aim of this study was to study the effect of the combination of antioxidants of sodium selenite and vitamin E on the indicants of physical development during chronic intoxication with magnesium chlorate in the prepubertal period.

Researches were conducted on 30 white rats of 21 days of age, the age of which was strictly observed from the day of their birth. Indicators of physical development were weight, body and tail length, height constant, and animal surface area. Body weight was measured using weights daily and expressed in grams. Other indicators of the physiological development of animals were determined 3 times during the experiment: at the beginning of the experiment (21 days of age), one day after the last injection of magnesium chlorate (42 days of age) and after completion of treatment (63 days of age). The length of the body was measured from the tip of the nose to the initial part of the tail, and the length of the tail - from



the initial part of the tail to its tip, and was expressed in centimeters. The surface area of animals was determined by the formula:

$$S=9,1 \times P^{2/3}$$

where P is the body weight (in grams) and expressed in square centimeters. The growth constant was determined by the formula:

$$K = \frac{\lg M_2 - \lg M_1}{\lg T_2 - \lg T_1}$$

where M1 and M2 - body weight (in grams), T1 and T2 - the age of animals in days. All animals were in the same conditions of vivarium and diet. Magnesium chlorate in 1/100 dose of DL50 was administered intragastrically for 21 days and caused a toxic state, after which the animals were divided into 4 groups: 1-group laboratory animals were injected with an aqueous solution of sodium selenite at a dose of 30 µg per 1 kg of body weight for 21 days subcutaneously [7, 12, 16, 22]; rats of the 2-group, an oil solution of vitamin E was administered at 50 mg / kg for 21 days intramuscularly [1, 3, 9, 10, 19, 20]; In the 3-group of experimental animals, antioxidants were administered in combination for 21 days every other day: vitamin E at a dose of 25 mg / kg intramuscularly, and sodium selenite at 15 mg / kg subcutaneously [6, 11, 15, 17]; The 4-group of rats was considered untreated, since they were injected with distilled water in the appropriate dosage for 3 weeks. Indicators of the growth and development of animals were determined at the age of 21 days, 42 days and 63 days of life. Obtained results were processed according to the generally accepted statistical method.

The effect of vitamins E antioxidants and sodium selenite on the physiological growth indicators of young animals at chronic intoxication with magnesium chlorate



Animal groups	Age (days)	Weight (gm)	Body Length (sm)	Tail Length (sm)	Surface area (sm²)	Growth constant
healthy	21	41,4±1,2 58	9,9±0,25 7	8,2±0,23 2	108,7±2,1 97	-
healthy	42	70,3±2,9 40 a	13,2±0,5 32 a	11,1±0,5 31 a	155,1±4,2 77 a	0,830±0,0 60
CG	42	50,5±1,3 71 a,b	10,6±0,2 82 b	8,8±0,25 1 b	124,3±2,2 55 a,b	0,285±0,0 11 b
healthy	63	82,3±3,2 52 b	15,3±0,5 42 b	13,4±0,3 71 b	172,3±4,5 30 b	0,667±0,0 37
CG+H₂O	63	60,8±1,9 56 d,g	11,5±0,5 85 g	9,5±0,25 5 g	140,8±3,0 10 d,g	0,314±0,0 14 g
CG+SEL	63	74,0±2,8 16 l	13,8±0,3 59 g,l	11,8±0,3 45 g,l	160,4±4,0 16 l	0,540±0,0 25 g,l
CG+Vit	63	76,3±1,7	14,2±0,5	12,4±0,6	163,9±2,4	0,672±0,0



		06	34	67	35	52
		1	1	1	1	1
CG+CO	63	81,3±3,3	15,4±0,6	13,5±0,5	170,9±4,8	0,521±0,0
M		73	26	65	23	34
		1	1	1	1	1

Note: CG - chronic hepatitis, SEL - sodium selenite, Vit - vitamin E, KOM - a combination. Reliability ($P < 0.05$); a - compared with 21 daytime healthy, b - compared with 42 daytime healthy, d - compared with 42 daytime poisoned, g - compared with 63 days healthy, l - compared with untreated animals.

When measuring 42 day and 63 day rats, compared with 21 day animals, it was noted an increase in body weight of 69.8% and 98.7%, body length by 33.3% and 54.5%, and tail length by 35 , 3% and 63.4%, surface area by 42.6% and 58.5%.

However, the performance of animals poisoned with magnesium chlorate compared with peers decreased: body weight by 19.6%, tail length by 20.7%, growth constant by 65.6%, and surface area by 19.8%.

Compared to the period of poisoning, experimental rats from the untreated group showed an increase in physiological development indicators - body weight by 20.3%, body length by 8.4%, tail length by 7.9%, growth constant by 10.1%, area surface by 13.2%. It should be specially noted that the indicators of the physical development of this group of animals compared with healthy peers were significantly reduced: body weight by 26.1%, body length by 24.8%, tail length by 19.1%, growth constant 52.9% , surface area of 18.2%, respectively.

When using antioxidants, the studied growth and development indices were very different from those of the untreated group: in rats treated with sodium



selenite, mass by 21.7%, body length by 20%, tail length by 24.2%, growth constant by 71.9%, area surface increased by 13.9%; and in animals treated with vitamin E, these indicators increased by 25.4%, by 23.4%, by 30.5%, by 14% and 16%, respectively.

Of particular note the results of animals treated with a combination of antioxidants - the indicators of this group not only increased, but almost reached the indicators of healthy peers.

As the obtained results show, in chronic intoxication with magnesium chlorate in the prepubertal period, in addition to chronic liver damage, a decrease in the physiological growth and development of animals is observed.

The use of antioxidants leads not only to the normalization of liver parameters, but also to the normalization of physiological growth indicators, contributing to the full development of the young body. The most effective therapeutically was a combination of antioxidants.

Thus, based on the foregoing, it can be concluded that in case of chronic intoxication of magnesium chlorate in the prepubertal period, the use of antioxidants, especially in combination, helps to restore the damaged structures and functions of the liver, which is the main reason for the normalization of the indicators and physiological development of the growing organism. Of particular note the affection of a combination of antioxidants and we think that the use of antioxidants in combination can be recommended to accelerate physical development at stunting of physical development of growing organism

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