

Effectiveness of toxicants elimination among children from the zones of slow and quick metabolism by means of physical culture

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Abstract. The article shows effectiveness of toxicants elimination in pre-school and junior school children from the zones of slow and quick metabolism. Created by us technology gave the following results. Special physical loads stimulate lead elimination in the zone of slow metabolism, the increased concentration of nickel normalization in children of different gender, the increased concentration of chromium and manganese in boys; in the zone of quick metabolism – zinc, chromium, cobalt, manganese among children of different gender, moreover they stimulate the elimination of benzene, deposited ethylbenzene, toluene and formaldehyde.

1 Introduction

Nowadays most part of the population lives in ecologically unfavorable conditions. First of all, these unfavorable conditions influence children. Interconnection is stated between the region of living and health state of population [1-5]. That is why technologies should be created for children in order to eliminate harmful substances out of the organism [8-10]. We created the ways of harmful substances elimination out of a person's organism [2, 6, 7].

In order to create the technologies of xenobiotics elimination out of the organism of pre-school and junior school age children we calculated the possibility of xenobiotics elimination increase out of the organism by means of physical culture. The research showed that in terms of one hour of sweating it is possible to eliminate 13% of daily dose of zinc, 2,5% of manganese, from 2,5 to 250% of iron and etc.. It proves that physical culture means can increase xenobiotics excretion out of children's organism [12].

2 Materials and methods

The following research methods were used: scientific-methodical sources analysis, atomic absorption analysis, questioning, pedagogical experiment, methods of mathematical statistics. Studying xenobiotics concentration in solid and liquid biosphere of children was realized in laboratories by highly-qualified specialists. Pedagogical experiment was held on the basis of sanitarium, situated in relatively ecologically clean place. Children came from ecologically unfavorable towns of Perm region. During the selection of children into experimental groups their age, gender, health level and other factors were taken into account. The control groups trained according to the plan of sanitarium, experimental groups trained according to created by us technology (picture1).

3 Results and discussion

Before the research the average concentration of lead in solid biospheres of children exceeded the norm by 18-35 times. During enterosorbent use, heat influence and physical exercises use within one sanitarium session its concentration decreased in boys by 98%, in girls –by 84%; in the control group the change in boys was 61%, in girls – 43%.

Lead concentration in urine of children from the experimental groups decreased: in boys by 36%, in girls – by 34%; in the control group the effect was also positive: in boys the decrease by 40%, in girls – by 26%.

Lead concentration decrease in the zones of slow and quick metabolism proved partial purification of an organism from this metal. Physical exercises inclusion into elimination technology increased lead elimination out of the main place of its deposition - skeletal system.

Before the research the average concentration of zinc in solid biospheres of children exceeded the norm 1,5 or twice. Zinc is the most important microelement [11] and physiological antagonist of lead. As a result of the research its concentration in the experimental groups validly decreased: in boys – by 30%, in girls – by 16%. In the control groups the decrease was the following: in boys– 34%, in girls – 36%. In spite of elimination influence increase in the experimental groups, physical exercises increased zinc absorbability in digestive tract or slowed down its redistribution into hair for further elimination from the organism.

Zinc concentration in urine of children from the experimental groups decreased: in boys – by 58%, in girls – by 44%; in the control group the effect was also positive: in boys the decrease by 38%, in girls – by 30%. It proved the

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accumulation of important for children metals in an organism during physical loads use. It was on the background of not complete normalization of zinc increased concentration in the studied biospheres of children. We can suppose that in terms of intensive physical exercises in ecologically clean place insignificantly increased zinc concentration in an organism is a physiological norm.

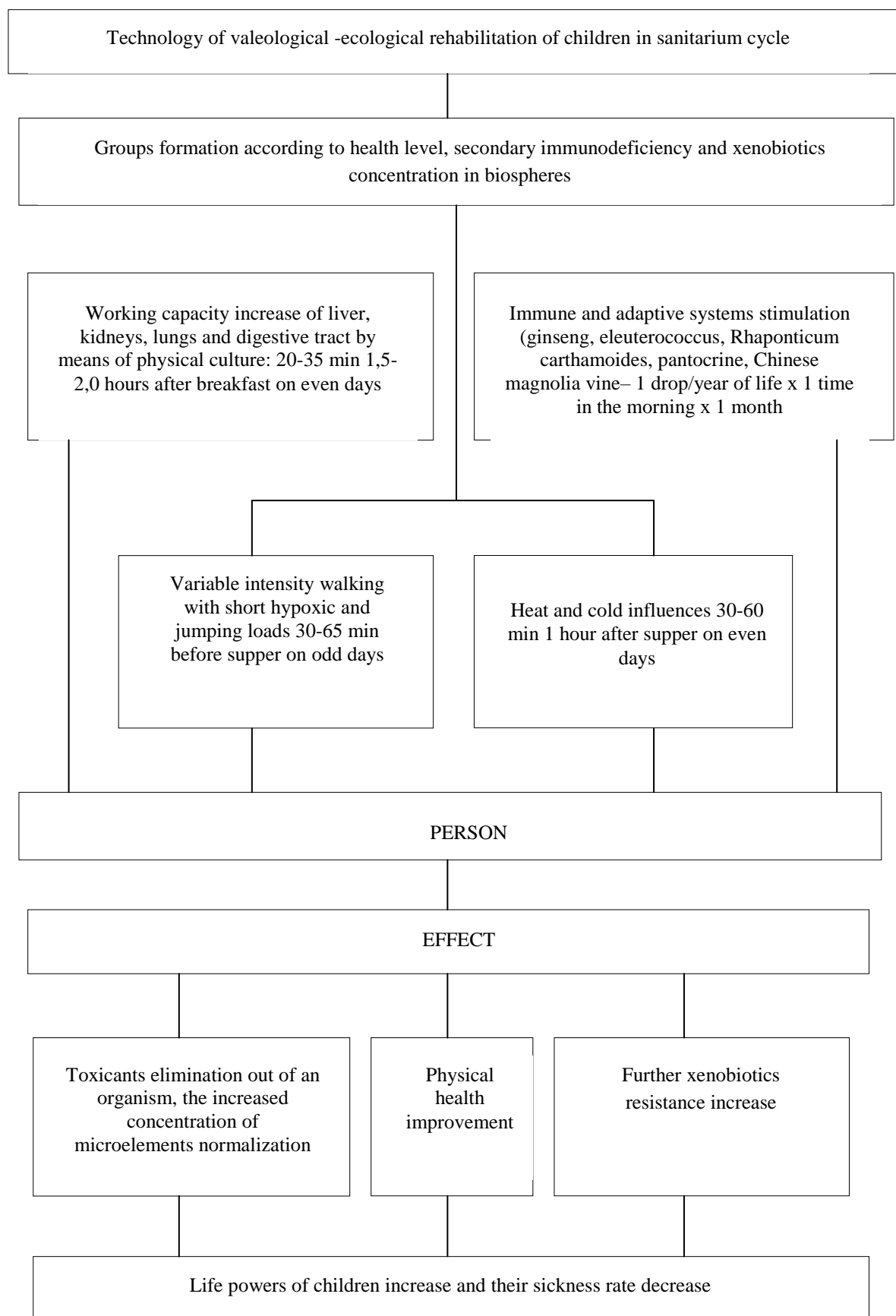


Fig. 1. Scheme of children's valeological-ecological rehabilitation technology

Chromium also belongs to vital microelements. Its average concentration in hair of children exceeds the norm by 1,6-2,1 times, in urine – 1,2-1,4 times. In the experimental groups chromium concentration decreased: in boys – by 51%, in girls – by 36%. In the control groups there also were positive changes: in boys and girls by 39%. Physical loads increased eliminating effect in boys and decreased it in girls. It can be explained by the fact that general volume and intensity of physical loads for girls were insignificantly lower, than in boys. It can be also explained by chromium absorbability increase in digestive tract or this microelement redistribution slow down for further elimination out of an organism.

Chromium concentration in children's urine decreased in all groups, proving intensity decrease of this metal elimination. For the increased concentration of chromium normalization in the organism of children one month of sanitarium session is enough. The role of physical loads revelation in different gender children demands additional research works organization.

Cobalt is a vital microelements, however its concentration in hair of children exceeded the norm in the groups by 1,5-35 times, in urine –1,4-2 times. In the experimental groups the concentration of cobalt decreased within one sanitarium session: in boys – by 69%, in girls – by 34%, in the control groups –by 100 and 33%. In all four groups changes were not valid, that is why for the role of physical loads revelation in both gender additional amount of respondents is necessary.

Cobalt concentration decrease in urine of children from experimental groups was 52% in boys and 42% in girls, which is insignificantly higher, than in the control groups: 49 and 39%. It proved insignificant intensity decrease of cobalt elimination with urine under the influence of physical loads. Cobalt concentration comparison with convetional norm at the end of the research shows that its concentration in urine was almost normal, in hair – it demanded further decrease.

Nickel belongs to conceptually vital microelements. Its average concentration in hair of the examined respondents exceeded the norm by 1,3-3,8 times, in urine –1,4 times. In the experimental groups concentration decrease in hair of boys was 78%, girls – 58%. In the control groups - 52 and 51%. Post-rehabilitation concentration of nickel in hair of children from the experimental groups turned out to be lower, than in control groups. It proved nickel elimination increase out of the zone of slow metabolism by means of physical culture.

Manganese is a vital microelement. Its concentration in hair exceeded the norm by 1,5-2,3 times, in urine –3,7-5,6 times. In the experimental groups manganese concentration decrease in hair was 68% in boys and 40% in girls; in the control groups – 29 and 30%. Higher eliminating effect in the experimental groups proved purifying influence in the zone of slow metabolism. Manganese concentration decrease in urine of children from the experimental groups was 60% among boys and 58% among girls; in the control groups – 51 and 3%. Big eliminating effect in the zones of quick and slow metabolism proved the increasing purifying influence of physical culture means.

The results of lead elimination out of children's organism and the increased zinc, chromium, nickel, cobalt, manganese concentration normalization make us come to the following conclusion: special physical loads stimulate lead elimination in the zone of slow metabolism, the increased nickel concentration normalization in children of different gender, chromium and manganese among boys; in the zone of quick metabolism – zinc, chromium, cobalt, manganese among children of different gender. Invalidation of cobalt concentration change in children of different gender, manganese among girls in the zone of slow metabolism, lead, nickel in children of different gender in the zone of quick metabolism proves the tendency of these metals concentration normalization in biospheres and demands additional research works organization.

Studying the effectiveness of organic xenobiotics elimination out of the children's organism was held in the same groups.

Benzene is a toxic hydrocarbon, which affects blood, blood-producing organs and also nervous system. In the experimental groups its concentration decrease in urine was 75% in boys and 80% in girls. In the control group this toxic element decrease in boys was 31% and in girls there was increase by 14%, which proves slow elimination of benzene from the places of deposition. Invalidation of rehabilitation shifts in all groups helped to reveal the tendency of this toxicant elimination stimulation out of the zone of quick metabolism in terms of physical exercises use.

Ethylbenzene is a toxic homolog of benzene. In the experimental groups its concentration decrease in urine was 75% in boys and 65% in girls. In the control groups ethylbenzene concentration increased. Different direction of ethylbenzene concentration change in children's urine proves that physical culture means use increases elimination of ethylbenzene not only out of the zone of quick metabolism, but also out of places of its deposition. Post-rehabilitation concentration of this toxicant in urine comparison with conventional norm proves insufficient duration of sanatorium session (28-35 days) for organism purification.

Toluene is a homolog of benzene, more toxic, than the least. In the experimental groups this element was in urine, which proves this toxicant elimination out of the places of deposition. In the control group of boys there was this toxicant decrease, in girls there were no changes. We suppose that physical exercises influence the places of toluene deposition.

Phenol is a nerve toxin and it is also the main metabolite of benzene. As a result of the research we defined one-directional increase of its concentration in all groups. Invalidation of shifts demands additional research works organization.

Formaldehyde is an organic toxicant. In the experimental group of boys its concentration invalidly increased by 30%, in girls decreased by 43%. In the control group was the same change: in boys the increase was 308%, in girls 32%. It proves slow elimination of the deposited formaldehyde in boys and quick elimination in girls, also these processes intensification under the influence of physical exercises.

Hydrogen cyanide is a toxic xenobiotic. During this toxin elimination there was zero post-rehabilitation concentration of it in urine of children from the experimental and control groups, which proves complete purification of the zone of quick metabolism. However, invalidation of shifts proves the efficiency of additional research works organization. The results of organic toxicants elimination out of children's organism help to come to the following conclusion: special physical loads stimulate benzene, deposited ethylbenzene, toluene and formaldehyde elimination. Invalidation of most shifts of organic xenobiotics concentration in urine proves the expediency of additional research works organization.

4 Conclusions

1. Special physical loads stimulate elimination of lead, normalization of nickel in children of different gender, chromium and manganese in boys in the zone of slow metabolism; in the zone of quick metabolism – zinc, chromium, cobalt, manganese in children of different gender. Invalidation of cobalt concentration change in children of different gender, manganese among girls in the zone of slow metabolism, lead, nickel in children of different gender in the zone of quick metabolism proves the tendency of stimulation of these metals concentration normalization in biospheres and demands additional research works organization.

2. Special physical loads stimulate elimination of benzene, deposited ethylbenzene, toluene and formaldehyde elimination. Invalidation of most shifts of organic xenobiotics concentration in urine proves the expediency of additional research works organization.

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