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Efficiency of Metabolic Therapy on the Perfomance Dynamics of Protein and Lipid Metabolism of Toddlers with Protein –Energy Malnutrition against the Background of Perinatal Lesions of the Central Nervous System

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Introduction. In recent decades the etiology of protein-energy malnutrition (PEM) of toddlers has greatly changed but the prognosis and the effects of the disease became less favorable [3]. Modern peculiarity of PEM course is primarily due to metabolic disorders that are the basis for the emergence and progress of pathological changes in the child's body [4].

In recent years the medicine is actively developing the so-called "metabolic direction", which aims at the analysis of various metabolic processes as a basis or background for the development of many diseases. In addition an active role of cell energy exchange violations in the course of various pathological processes is especially activity formed in the current scientific studies.

According to the data of literature, a significant role in the cellular energy transfer plays carnitine. The important role of carnitine in bioenergy processes is that it is directly involved in the catabolism of lipids. Main metabolic function of L-carnitine is to transport long chain fatty acids across the mitochondrial membrane allowing L-carnitine to provide the energy body with. Also L-carnitine has metabolic, anabolic and antihypoxic function [1]. In addition, the energy performance of L-carnitine has a beneficial effect on the condition of the liver, resulting in increased protein-synthetic function and increased glycogen content [2].

Depletion of endogenous carnitine reserves and violation of their assimilation is marked when children suffer from malnutrition. It should be noted that carnitine biosynthesis is limited among children of this category of due to low muscle mass as the admission of ordinary food is not able to maintain a sufficient level of it in his blood and tissues [1]. This in its turn causes a high risk of developing carnitine failure of toddler with PEM. Therefore in recent years we pay a great attention to metabolic therapy as significant pathogenetic link of many diseases of infants in the treatment of various pathological conditions of toddlers.

A special place in the complex set of metabolic disorders with PEM against the background of perinatal lesions of the central nervous system takes tissue hypoxia which in its turn leads to energy failure and violation of plastic processes of toddlers.

Purpose. To estimate the efficacy of the drug "Agvantar" of protein-energy malnutrition of toddlers which had emerged against the background of perinatal lesions of the central system.

Methods and matherials. According to this goal we have examined 70 children with PEM against the background of perinatal lesions of the central nervous system. Children's age ranged from 1 to 12 months of life. The study was based on clinical examination of the children with an assessment of their physical development by order of the Ministry of Health of Ukraine № 149 from 20.03.2008. The criteria for inclusion in the study was a breach of protein and lipid metabolism of toddlers with protein-energy malnutrition against the background of perinatal lesions of the CNS.

To study the efficiency of metabolic therapy PEM against the background of perinatal CNS lesions of toddlers the drug "Agvantar" was used (LLC "Ersel Pharma Ukraine") which is already quite extensive experience with pediatrics. This drug comes in the form of syrup 1 ml of which contains 200 mg Levocarnitine. The main pharmacodynamic properties of the drug is that Levocarnitin is the main cofactor of metabolism of fatty acids in the heart muscle, liver and skeletal muscle it acts as the main carrier of long chain fatty acids into the mitochondria improves metabolism helps to normalize metabolism. Medicinal product "Agvantar" refers to low toxic substances has no mutagenic and carcinogenic activity which enables reception for children from the first days of life. "Agvantar" was administered orally to children of 0.5-1.0 ml twice a day for 30 minutes to eat meals for 25-30 days. Side effect of the drug "Agvantar" was not observed with any patient using it.

According to the method of occasional selection the patients were divided into two groups: 35 children got with complex therapy PEM with "Agvantar", 35 children got only traditional therapy and made the comparison group. Conventional treatment of toddler with protein-energy malnutrition was performed according the

protocol of the Ministry of Health of Ukraine №9 from 10.01.05. The groups were representative by age, sex, degree of protein- energy deficiency and the structure of perinatal lesions of the CNS. The control group consisted of 30 practically healthy toddlers with normal physical development.

While studing to identify the major disturbances of protein metabolism, we determined the levels of total protein levels and insulin-like growth factor -1 (IGF-1). Determination of total serum protein was performed biuret method. Quantitative determination of IGF-1 serum was performed using *imunoferment* method. The level of cholesterol, triglycerides and lipoprotein were determined immunoenzymatic method.

While studing, we conducted an analysis of both clinical and laboratory efficacy of the medicinal product «Agvantar» of toddlers with PEM, which emerged against the background of perinatal lesions of the CNS. The main clinical parameters of efficacy of the drug

L-carnitine as a metabolic therapy of protein- energy malnutrition of the toddlers against the background of perinatal lesions of the central nervous system was the dynamics in body weight and improvement of appetite. Body mass index was registered daily throughout all the period stay of childrens in hospital. Effectiveness of treatment with drugs Agvantar was also assessed by laboratory parameters, such as indicators for protein and lipid metabolism. The studied laboratory parameters were measured on admission as well as at the end of treatment with L-carnitine. Statistical analysis of the results was carried out by using variational statistical program Microsoft Statistika 6.0.

Results and discussion. The structure of perinatal CNS lesions predominated hypoxic-ischemic damage to the central nervous system. Among them the syndrome of motor disorders occurred in 21 (30%) of children, muscular dystonia syndrome in 18 (25,7%) cases the syndrome of vegetative-visceral disturbances in 14 (20%) cases. Hydrocephalus took place in 10 (14,3%) of the children and microcephaly in 7 (10%) of cases.

We found out that 41% of the toddlers of the studied group had second grade of PEM (average underweight in them was 26±1,4%). Whereas the degree of PEM (average underweight 17,7±1%) was detected in 33,3% of the children and 25,7% of the respondents had the third degree PEM (mean body weight deficiency was 39,5±2%).

The term of hospital treatment of the toddlers with PEM against the background of perinatal CNS lesions was 28±2 days. During this time the children of the first group had received a full course of study treatment with drug «Agvantar». Assessment of the dynamics of body weight was performed daily. We used an average data of these parameters for clinical efficacy of metabolic therapy. Thus the rate of weight gain during in patient treatment in the first group was (0,6±0,1 kg) while in the second group of children the figure stood at (0,4±0,06 kg) ($p<0,05$).

Significant influence on the development of PEM among toddlers ranks metabolic proteins. As most disorders of protein metabolism are the basis of protein-energy deficiency. Investigated range of values of serum protein did not reveal probable differences between groups for comparison of total protein (60,5±2,1 g/l and 61,3±0,9 g/l).

We have studied the influence of the drug L-carnitine on parameters of protein metabolism. During our study we found out that toddlers with perinatal CNS who underwent therapy of metabolic PEM with drug «Agvantar» had a significant increase of protein metabolism compared with the initial levels ($p<0,05$). Thus the first group of the research at the end of the course of metabolic therapy was observed to have a reliable increase for total serum protein in comparison with the index of the childrens of the compared group ($p<0,05$). In addition, the first group of children was noted for normalization of IGF-1 compared with the original data (respectively (48,4±1,1 ng/l) before treatment and (54,1±1,3 ng/l) after treatment) ($p<0,05$).

The results of the study of the dynamics of lipid abnormalities of examined children with use in metabolic therapy the drug of «Agvantar» showed a significant increase in cholesterol, triglycerides and LDL ($p<0,05$). Thus the rate of cholesterol, triglycerides and LDL to treat the first group was (3,13±0,25 mmol/l, 1,7±0,2 mmol/l and 1,57±0,18 mmol/l respectively) and after treatment these figures increased reliably (3,4±0,28 mmol/l, 1,75±0,2 mmol/l and 1,62±0,18 mmol/l, respectively) ($p<0,05$). While the children in the second group of studies were treated on traditional indicators of diet cholesterol, triglycerides and LDL cholesterol did not change reliably ($p>0,05$).

Conclusions. Thus our study showed the clinical effectiveness of the drug L-carnitine in the treatment of protein- energy deficiency against the background of perinatal lesions of the central nervous system of toddlers it is well tolerated and has no adverse reactions.

It was ascertained that the inclusion of the drug «Agvantar» in the medical complex of conventional therapy effectively reduces the clinical manifestations of protein-energy malnutrition against the background of perinatal lesions of the central system of toddlers. In addition these data demonstrate the ability of the drug «Agvantar» (as metabolic therapy) to promote positive tendency of protein rates and lipid and metabolism of toddlers with PEM which emerged against the background of perinatal lesions of the CNS.

Prospectives for further research. In the future it is planned to study the effect of the drug "Agvantar" on parameters of carbohydrate metabolism of toddlers with protein-energy malnutrition, which occurred against the background of perinatal lesions of the central nervous system

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ЕФЕКТИВНІСТЬ МЕТАБОЛІЧНОЇ ТЕРАПІЇ НА ДИНАМІКУ ПОКАЗНИКІВ БІЛКОВОГО І ЛІПІДНОГО ОБМІНІВ У ДІТЕЙ ПЕРШОГО РОКУ ЖИТТЯ ІЗ БІЛКОВО-ЕНЕРГЕТИЧНОЮ НЕДОСТАТНІСТЮ НА ТЛІ ПЕРИНАТАЛЬНИХ УРАЖЕНЬ ЦЕНТРАЛЬНОЇ НЕРВОВОЇ СИСТЕМИ

Токарчук Н. І., Чигір І. В.

Резюме. В статті наведені результати клінічного дослідження можливостей використання препарату «Агвантар» в якості метаболічної терапії білково-енергетичної недостатності у дітей першого року життя, яка виникла на тлі перинатальних уражень центральної нервової системи. На тлі застосування препарату «Агвантар» відбулося достовірне підвищення показників білкового та ліпідного ($p < 0,05$). Крім того, включення лікарського препарату «Агвантар» у лікувальний комплекс сприяло зменшенню клінічних проявів білко-енергетичної недостатності у дітей першого року життя на тлі перинатальних уражень центральної нервової системи.

Ключові слова: діти, білково-енергетична недостатність, Агвантар.

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ЭФФЕКТИВНОСТЬ МЕТАБОЛИЧЕСКОЙ ТЕРАПИИ НА ДИНАМИКУ ПОКАЗАТЕЛЕЙ БЕЛКОВОГО И ЛИПИДНОГО ОБМЕНОВ У ДЕТЕЙ ПЕРВОГО ГОДА ЖИЗНИ С БЕЛКОВО-ЭНЕРГЕТИЧЕСКОЙ НЕДОСТАТОЧНОСТЬЮ НА ФОНЕ ПЕРИНАТАЛЬНЫХ ПОРАЖЕНИЙ ЦЕНТРАЛЬНОЙ НЕРВНОЙ СИСТЕМЫ

Токарчук Н. И., Чигирь И. В.

Резюме. В статье приведены результаты клинического исследования возможностей использования препарата «Агвантар» в качестве метаболической терапии белково-энергетической недостаточности у детей первого года жизни, которая возникла на фоне перинатальных поражений центральной нервной системы. На фоне применения препарата «Агвантар» произошло достоверное повышение показателей белкового и липидного обменов ($p < 0,05$). Кроме того, включение лекарственного препарата «Агвантар» в лечебный комплекс способствовало уменьшению клинических проявлений белково-энергетической недостаточности у детей первого года жизни на фоне перинатальных поражений центральной нервной системы.

Ключевые слова: дети, белково-энергетическая недостаточность, Агвантар.

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Abstract. *Introduction.* Modern peculiarity of protein-energy malnutrition (PEM) course is primarily due to metabolic disorders that are the basis for the emergence and progress of pathological changes in the child's body.

According to the data of literature, a significant role in the cellular energy transfer plays carnitine. Main metabolic function of L- carnitine is to transport long chain fatty acids across the mitochondrial membrane allowing L- carnitine to provide the energy body with. Also L- carnitine has metabolic, anabolic and antihypoxic function.

Objective: to estimate the efficacy of the drug "Agvantar" of protein-energy malnutrition of toddlers which had emerged against the background of perinatal lesions of the central nervous system.

Object and methods. We have examined 70 children with PEM against the background of perinatal lesions of the central nervous system (CNS). Children's age ranged from 1 to 12 months of life. The study was based on clinical examination of the children with an assessment of their physical development. To study the efficiency of metabolic therapy PEM against the background of perinatal CNS lesions of toddlers the drug "Agvantar" was used. This drug comes in the form of syrup 1 ml of which contains 200 mg Levocarnitine. "Agvantar" was administered orally to children of 0. 5-1. 0 ml twice a day for 30 minutes to eat meals for 25-30 days. Side effect of the drug Agvantar was not observed with any patient.

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Keywords: children, protein-energy malnutrition, «Agvantar».

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