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EFFICACY OF METFORMIN IN COMBINATION OZONE THERAPY IN CHILDREN AND ADOLESCENTS WITH METOBOLIC SYNDROME

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Annotation: The aim of the study: to study the possibility of use in adolescent children with signs of metabolic syndrome. We examined 15 children and 35 adolescents who received the following medications: ozonated isotonic sodium chloride solution ozone therapy is combined therapy (a sub-calorie diet of 1600 kcal+ metformin at a dose of 500 mg during dinner). As a result of treatment, a decrease in the level of basal insulinemia, an improvement in lipid metabolism, and normalization of blood pressure were observed. Thus, the use of metformin with a combination of ozone therapy in children and adolescents with metabolic syndrome is an effective and safe means of eliminating insulin resistance.

Keywords: metabolic syndrome, ozone therapy, metformin, insulin resistance, children and adolescents.

The number of obese patients is steadily increasing worldwide, which has allowed WHO to view the disease as an epidemic affecting millions of people. Moreover, a progressive increase in the prevalence of obesity is observed among both adults and children. So in economically developed countries, including Russia, every third inhabitant has a body weight exceeding the maximum maximum permissible [1]. In the United States, more than 74 million people are obese, including 35% and 31% of men over the age of 20, as well as 25% of children and adolescents.

It is known that obesity is often associated with diseases such as type 2 diabetes mellitus (DM2), arterial hypertension (AH), atherosclerosis, etc. Numerous promising studies have proved that the combination of such disorders increases mortality among the working-age population [2]. In recent years, a lot of information has accumulated about the common etiological and pathogenetic factors of hypertension, obesity, disorders of carbohydrate and lipid metabolism, which made it possible to combine these conditions into a single concept of " metabolic syndrome X "(MS) or "insulin resistance syndrome". It is based on a decrease in the sensitivity of peripheral tissues to the action of insulin [3]. Disorders associated with MS often begin to form in childhood and adolescence, long before the clinical manifestation of DM2, hypertension, and atherosclerotic vascular lesions, which dictates the need to start measures for the prevention of these conditions from childhood. Taking into account the accumulated data

on the role of insulin resistance (IR) in the pathogenesis of this syndrome, the use of metformin from the biguanide group and intravenous ozone therapy medozon in a complex of therapeutic measures is of interest YOTA 60-01.

The main mechanisms of action of metformin are: inhibition of the processes of gluconeogenesis and glycogenolysis in the liver, increased sensitivity of peripheral tissues to the action of insulin, and a decrease in systemic hyperinsulinemia. As an alternative or additional therapy, the use of ozonated isotonic sodium chloride solution is recommended. The main mechanisms of action ozone has a versatile effect on various organs and systems of the body. In natural concentrations, ozone has a stimulating effect on the human body: it increases resistance to cold, toxic substances, hypoxia, causes an increase in the content of hemoglobin and red blood cells in the blood, increases the phagocytic activity of white blood cells, the complement titer of blood serum, and the immunobiological potential of the body. Antimicrobial effects-ozone can destroy many types of microbes. Antiviral properties-the gas has a destructive effect on viruses, even those that are resistant to antiviral drugs. Elimination of inflammation. Lipolysis – partial breakdown of fat cells, acceleration of metabolic processes in subcutaneous fat.

The aim of the study was to study the possibility of using metformin in combination with ozone therapy in children and adolescents with MS symptoms.

Research material and methods

The study included 50 obese children and adolescents aged 12 to 17 years (mean age 13.75 ± 0.25 years). All patients were evaluated for anthropometric parameters: height, body weight, body mass index (BMI). The waist/hip index (ITB) was calculated, and blood pressure (BP) was determined. When assessing BMI, the standards proposed for children were used L.D. Hammer et al.[4]. ITB was evaluated taking into account the recommendations of O. V. Borodino et al. [5]: when ITB values were more than 0.8 in girls and more than 0.9 in boys, the abdominal type of obesity was detected. BP was measured on the right arm and evaluated by age criteria [6]. Blood levels of total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) and very low-density lipoprotein cholesterol (VLDL-C), and fasting blood glucose were determined. When the fasting blood glucose level was less than 6.1 mmol/L, a standard glucose tolerance test was performed. The concentration of immunoreactive insulin (IRI) in the blood was also studied with the calculation of the index HOMA- IR. Microalbuminuria (MAU) was studied in all children. The above parameters were determined twice: before treatment and six months after its start.

Twenty children aged 12 to 15 years with signs of MS were prescribed ozone therapy, which included a sub-calorie diet of 1600 kcal and metformin at a dose of 500 mg during dinner. To date, 15 children have been examined in detail (before the start of therapy and after six months of its use).

Results and discussions

BMI in patients of both sexes exceeded the known standards (27.8 ± 0.42 kg / m²), and in 32 of the 50 examined patients, judging by the ITB figures (0.90 ± 0.01 cm), obesity was abdominal in nature, which, as is known, is a clinical marker of insulin resistance, Individual analysis of the results of blood pressure measurement taking into account the age standards for each child was identified as having arterial hypertension in 25 children. A detailed analysis of glycemic indicators revealed that one teenager had DM2, four had impaired glucose tolerance, 5 more patients had impaired fasting glycemia , and a total of 10 children had carbohydrate metabolism disorders. Basal insulin levels were found to be high in 11 children (more than 22.0 MIU / ml). Verified version HOMA - the analysis of insulin resistance was found in 26 examined children. Analysis of lipid metabolism parameters revealed the presence of hypercholesterolemia (5.66 ± 0.07 mmol/L) in 8 children, hypertriglyceridemia (2.93 ± 0.15 mmol/L) in 4 children. Increases in VLDL cholesterol were detected in 22 cases, while a high level of HDL cholesterol was detected in water. UIA was detected in 2 children.

Analysis of the results of using ozone therapy in combination for six months in 29 children revealed

the following. Average BMI values changed for the better by the end of the sixth month of treatment (see Table). more than 73% of children experienced a decrease in BMI. As can be seen from the table, after six months of treatment, children also showed a decrease in blood pressure, a decrease in the concentration of CCS, LDL cholesterol, and VLDL cholesterol in the blood.

It is noteworthy that the drug metformin and ozone therapy had a pronounced effect on the level of basal insulinemia. In our observations, a decrease in hyperinsulinemia, indicating a decrease in the severity of IR, occurred in 10 (66.76 %) cases.No side effects were observed during treatment with metformin.

Dynamics of clinical and laboratory parameters in children and adolescents with MS on the background of ozone therapy with metformin

Parameters

Parameters	Originally published	After 6 months
BMI, кг/м2	30,63 ± 1,36	27,8±1,49
ITB	0,88± 0,02	0.84±0.02
SAD. mmHg stb	125,33± 3,60	112,33±2,55
DBP. mmHg stb.	79,33± 2,48	73,66±2,34
Insulin 0, UME / ml	50,33±10,03	17,64± 3,07
Glycemia 0, mmol / l	5,03± 0,12	4,23± 0,22**
Total cholesterol, mmol / l	4,48± 0,14	4,05± 0,12
LDL CHOLESTEROL, %	45,88±2,46	39,20±0,09
VLDL CHOLESTEROL %	22,97±2,68	12,5± 1,54
HDL CHOLESTEROL%	29,33±2,40	33,93±0,67
TG, mmol / l	1,71± 0,20	1,51±0,19
HOMA – IR	9,56± 1,93	4,00±0,12

Notes* p compared to the original values.

Conclusions

Metformin siofor 500 (Berlin Chemi) in combination with ozone therapy is an effective and safe treatment for metabolic syndrome in children over 12 years of age.

The use of Metformin in children with metabolic syndrome helps to eliminate insulin resistance, as evidenced by a decrease in body weight and the level of insulinemia in some cases

Application ozonated isotonic sodium chloride solution ozone therapy is comparable to that of standard therapy in terms of lipid metabolism and oxidative stress.

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