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Assessment of the Effectiveness of Treatment of Rachit in Children by Gas-Liquid Chromatography

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ABSTRACT

Introduction: Gas chromatography is one of the methods for determining markers such as fatty acids in the metabolic processes in the human body. We have developed a method for the determination of fatty acids in various pathological conditions, which includes the selection of a stationary phase and optimization of separation conditions.

Objective: To evaluate the effectiveness of treatment of rickets in children using apricot oil and aevit by gas-liquid chromatography.

Methods: The composition of higher fatty acids in blood serum in 87 children with rickets was determined by gas-liquid chromatography. To identify the separated methyl esters of fatty acids, we used the "bystanders" method and the method based on the "sorbent – sorbate" structural group components. A study of the composition of higher fatty acids in the blood serum was carried out in children with rickets - group I (38 sick children with rickets) undergoing the traditional method of treatment and group II (49 sick children with rickets) - with a combination of the traditional method of treatment with the use of modified therapy.

Results: We found C(16:0)-palmitic, C(16:1)-palmitoleic, C(18:0)-stearic, C (18:1)-oleic, C(18:2)-linoleic, C(18:3)-linolenic and C(20:4)-arachidonic acids in blood serum. In the examined children with rickets, who received traditional treatment, lipid imbalance was noted. The application of the modified method of treatment has shown its high efficiency and the indicators of the fatty acid composition of the blood returned to normal in the majority of children with rickets.

Conclusion: Children with rickets have significant disorders of fatty acid metabolism. To correct the dismetabolism of higher fatty acids, along with traditional therapy, it is recommended to prescribe a modified method of treatment using apricot oil and aevit, which ensures high efficiency of therapy in children with rickets.

Key Words: Rickets, Dismetabolism, Fatty acids, Apricot oil, Aevit, Traditional treatment, Modified method of treatment

INTRODUCTION

In recent years, gas chromatography has become one of the methods for determining markers of metabolic processes in the human body. In this regard, a special place is occupied by fatty acids, the determination of which is easily performed by gas-liquid chromatography.¹

We have developed a method for the determination of fatty acids in various pathological conditions, which includes the selection of a stationary phase and optimization of separation conditions.^{2,3} This technique was applied to study the fatty acid composition of blood serum in children with various pathologies, and the features of lipid metabolism in patients with vesicovaginal fistulas were studied.⁴

Rickets is not only a pediatric, but also a medico-social problem, the essence of which is a violation of the general metabolism, phosphorus-calcium, lipid metabolism, disorders of skeletal mineralization and the functional state of internal organs and systems.^{5,6} The use of this technique to assess the effectiveness of the combined use of vegetable oil and antioxidants in the complex treatment of rickets is relevant from the point of view of the choice of corrective therapy.

Purpose of the study. Evaluation of the effectiveness of treatment of rickets in children using apricot oil and aevit by gas-liquid chromatography

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MATERIALS AND METHODS

To achieve this goal, 87 patients with rickets were examined. Of these, 42 patients with rickets who were observed in the children's polyclinic No. 1 in Samarkand and 45 children with rickets, aggravated by pneumonia and malnutrition, who are hospitalized in the clinic No. 2 SamMI. The control group consisted of 10 apparently healthy children.

The composition of higher fatty acids in the blood serum of children with rickets was determined by gas-liquid chromatography.⁵ To identify the separated methyl esters of fatty acids, we used the "bystanders" method and the method based on the "sorbent – sorbate" structural group components. As a result of identification, the following fatty acids were found in blood serum: C (16:0) - palmitic, C (16:1) - palmitoleic, C (18:0) - stearic, C (18:1) - oleic, C (18:2) - linoleic, C (18:3) - linolenic and C (20:4) - arachidonic. The fatty acid content was determined by the method of internal normalization.

RESULTS

The examined patients were divided into 2 groups. Group I of children (38 patients) with rickets received the traditional method of therapy. Results investigated are presented in table 2.

Group II of the examined children with rickets (49 patients) received apricot oil and aevit against the background of the traditional method of treatment (Table 1).

Table 1: Composition and content of fatty acids in blood serum in children with rickets

Fatty acids	Control	During examination	P<
C (16:0)	28.17±1.37	30.87±1.53	0.01
C (16:1)	2.70±0.22	1.38±0.64	0.05
C (18:0)	26.13±1.32	28.03±1.04	0.01
C (18:1)	0.90±0.13	0.66±0.6	0.01
C (18:2)	33.32±2.51	29.73±2.34	0.05
C (18:3)	2.41±0.45	2.58±0.50	0.01
C (20:4)	3.56±0.60	2.68±0.60	0.01

P - significance of the difference between the indicators in the group of patients and healthy people.

A study of the composition of higher fatty acids in the blood serum was carried out in children with rickets (group I - 38 sick children with rickets) who were on the traditional method of treatment and group II (49 sick children with rickets) - when the traditional method of treatment was combined with the use of modified therapy.

The results obtained for determining the content of higher fatty acids in the blood serum of children with rickets in

comparison with the data of healthy children are presented in Table 2.

Table 2: Composition and content of fatty acids (in%) in blood serum depending on the method of treatment

Fatty acids	Control	Treatmentmethod			
		Traditional M±M	P<	Modified M±M	P<
C (16:0)	28.17±1.37	28.96±1.28	0.01	28.21±1.31	0.1
C (16:1)	2.70±0.22	1.62, ±0.43	0.01	2.55±0.30	0.1
C (18:0)	26.13±1.32	27.67±0.82	0.20	26.75±0.80	0.1
C (18:1)	0.90±0.13	0.76±0.10	0.20	0.92±0.10	0.1
C (18:2)	33.32±2.51	30.74±2.10	0.50	33.12±1.80	0.1
C (18:3)	2.41±0.45	2.11±0.45	0.05	2.73±0.45	0.1
C (20:4)	3.56±0.60	2.10±0.51	0.05	3.26±0.40	0.1

P - relatively healthy

The examined children with rickets, who received traditional treatment, showed a wide range of fluctuations in the studied parameters of lipid metabolism.

DISCUSSION

Studies have shown that the stability of lipid dysmetabolism under the influence of the generally accepted treatment complex is probably due to the fact that the action of specific therapy in the body is primarily aimed at correcting calcium-phosphorus metabolism. It can be assumed that the absence of noticeable positive dynamics of the fatty acid spectrum under the influence of conventional complex therapy makes it difficult to realize the effect of vitamin D in the body, since it is proved that under the influence of lipid dysmetabolism, a decrease in the level of 1,25-dioxycholecalciferol in plasma is observed, which is one of the most active metabolites of vitamin D.^{7,8} This is probably due to a violation of its renal metabolism under conditions of lipid dysmetabolism.

The next group of examined children with rickets (n=49) received apricot oil and aevit against the background of the traditional method of treatment. The results of the study are presented in table 2. Apricot oil was used as a substance correcting impaired lipid metabolism. Apricot oil has a light brown color, transparent, without impurities, precipitation, rich in polyunsaturated fatty acids, has a pleasant smell and taste, has a high biological activity and has a beneficial effect on metabolic processes in the child's body. Apricot oil was prescribed for rickets of the 1st degree of severity for 12-14 days, with the 2nd degree of the disease for 24 days at the rate of 0.5 ml / kg of body weight. Aevit is prescribed for rickets of 1 severity, 0.3 ml (i / m) for 4-6 days, with II degree of the disease, for 7-10 days, 1 time per day.⁹⁻¹¹

As you can see from the table. 2, that the modified method of treatment performed showed its high efficiency, which is confirmed by the obtained data: C (16:0) - $28.21 \pm 1.31\%$, C (16:1) - $2.55 \pm 0.30\%$, C (18:0) - $26.75 \pm 0.80\%$, C (18:1) - $0.92 \pm 0.10\%$, C (18:2) - $33.12 \pm 1.80\%$; C (18:3) - $2.73 \pm 0.45\%$; C (20:4) - $3.26 \pm 0.40\%$, i.e. under the influence of the modified treatment, the fatty acid composition indices returned to normal in the majority of patients.

Dyslipidemic shifts and impaired phosphorus-calcium metabolism play a role not only in the genesis of the development of rickets, but also in very specific mechanisms for the formation of severity of rickets.

The data presented above confirm the idea of the pathogenic role of lipid imbalance and disorders of phosphorus-calcium metabolism in the mechanisms of pathogenesis of rickets in the examined children, the following theoretical premises follow from this:

- a) the very essence of dyslipidemic changes is an important link in the general mechanisms of the pathogenesis of rickets.^{5,12}
- b) the degree of imbalance in the spectrum of higher fatty acids, the presence of a deficiency of antioxidants largely determines the mechanism for the formation of the severity of the disease.

Obviously, the results obtained allow us to conclude that the positive “biochemical” effect of the treatment option using apricot oil and Aevit in children with rickets is highly reliable along with traditional therapy.¹³⁻¹⁵

CONCLUSIONS

The children with rickets have significant disorders of fatty acid metabolism. To correct the dismetabolism of higher fatty acids, along with traditional therapy, it is recommended to prescribe apricot oil and aevit, which ensures high efficiency of therapy in children with rickets. Apricot oil was prescribed for rickets of the 1st degree of severity for 12-14 days, with the 2nd degree of the disease for 24 days at the rate of 0.5 ml / kg of body weight. Aevit is prescribed for rickets of I severity, 0.3 ml (i / m) for 4-6 days, with II degree of the disease, for 7-10 days, 1 time per day.

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