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CLINICAL AND ANAMNESTIC FEATURES OF ACETONEMIC SYNDROME IN CHILDREN WITH PATHOLOGY OF THE DIGESTIVE SYSTEM

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Abstract

In the practice of a gastroenterologist, diseases that are accompanied by a clinic of acetone syndrome are of particular relevance. The study involved 38 children with acetonemic syndrome on the background of gastroenterological pathology. Two clinical groups of observations were formed: I group included 25 children with moderate ketosis, II group - 13 children with severe ketosis. The paper presents comparative analysis of results of clinical and anamnestic examination of children depending on the severity of the course of pathology. Patients with less pronounced signs of acetonemic syndrome were characterized by higher occurrence of acetonemia per year, longer period of breastfeeding, more frequently compromised individual allergic anamnesis. Patients with severe acetonemic syndrome differed by higher infectious index, a tendency to bigger body mass indices, association with exacerbated gastroduodenal pathology.

Key words: children, gastroduodenal pathology, acetonemic syndrome, clinical-anamnestic indices.

Introduction. Acetonemic syndrome (non-diabetic ketoacidosis, acetonemic vomiting) is the range of symptoms caused by an increased concentration of ketone bodies in the blood plasma occurring mostly in childhood and manifested by repeated episodes of vomiting [1]. Ketogenesis stimulation in case food deficiency, starvation, infectious fever, lasting vomiting, and other pathological conditions are available is a compensatory process, when energy deficiency is supplied at the expense of gluconeogenesis utilizing fatty acids and ketogenic amino acids. In spite of compensatory-adjustment character of ketogenesis there are many clinical situations that can be associated with the development of concomitant or secondary ketosis and ketoacidosis [7].

Information concerning occurrence of secondary acetonemic syndrome are not available both either in domestic or foreign literature. Determination of etiological factor is the main in its diagnostics, which is considerably important for further therapeutic tactics [5, 6]. Rather often acetonemic syndrome compromises development of digestive organ diseases in children. It frequently occurs in children in case of comorbid pathology of the gastrointestinal tract associated with intoxication symptoms, toxic liver lesions, cholestasis, exocrine insufficiency of the pancreas, and disorders in the intestinal microflora. Clinical manifestation of acetonemic syndrome in these cases is determined by the underlying disease with associated symptoms of ketonemia and ketonuria. The liver is the major and practically the only organ where ketone (acetone) bodies are produced from fatty acids. Practically any pathological process afflicting the hepatic-biliary system results in disorders of lipid metabolism, intensification of ketogenesis processes and increased concentration of ketone bodies in the blood [4].

When acetonemic syndrome is verified, severity of the course is predicted and therapeutic tactics is determined, clinicians emphasize a leading role of clinical-anamnestic criteria [3,7]. Considering irregularity of secondary acetonemic conditions and lack of scientific studies, both domestic and foreign ones on the subject, we suggested it to be reasonable to examine the groups of patients with ketosis of various severity against the background of gastroenterological pathology on the basis of the results of clinical examination of sick children.

Objective: to analyze clinical-anamnestic indices of acetonemic syndrome severity in children against the background of gastroenterological pathology exacerbation.

Materials and methods. 38 children aged from 2 to 15 with acetonemic syndrome were under doctor's care in the Gastroenterological Department of the Regional Clinical Children Hospital in the town of Chernivtsi. An average age of the examined children was

7,0±0,6, including 60,5% of girls and 78,9% of rural residents among them. The patients were admitted during the whole year, but their number increased considerably during the period from April to July. The period of acetonemic crisis was admitted in children on admission. 65,0% of patients developed moderate ketosis (ketonuria ++). Every third child was admitted with severe ketosis (ketonuria Patients with severe ketosis were admitted to the hospital 4 times as much. Gastroduodenal (76,3%) and hepatic-biliary pathology (65,8%) prevailed among children, pancreatic pathology occurred not so often (25,8%). Diseases of the gastroduodenal area were determined more often in children with severe signs of acetonemic syndrome: functional dyspepsia, gastritis or gastroduodenitis with high acidity during exacerbation period with pronounced dyspeptic syndrome that was likely to provoke excessive ketosis. Pathology of the biliary system was mainly diagnosed in children with moderate ketosis in the form of functional (dyskinetic) disorders of the gallbladder and Oddi's sphincter, chronic acalculous cholecystitis with clinical-paraclinical complex of symptoms peculiar for cholestasis and cytolysis.

Two clinical groups of observations were formed: I group included 25 children with moderate ketosis (ketonuria ++), II group - 13 children with severe ketosis (ketonuria ++++). The groups of observations did not differ reliably by the sex, age, and place of residence. Acetonemic syndrome was confirmed when nausea, vomiting, refusal to eat, in certain cases to drink, "acetone" smell in expired air, inertness, lethargy, acetonuria/ketonuria were available [1]. Severity of ketosis on admission was evaluated by means of semi-quantitative method to determine acetone level in urine – from one (+) to four pluses (++++) applying indicator test papers. Detection of ketone bodies in urine is an indirect indicator of ketonemia, since expressiveness of acetonuria in «+++» corresponds to an increased level of ketone bodies in the blood to 400 times, and «++++» - to 600 times [4].

The obtained results of the study were analyzed by means of the computer packets «STATISTICA» StatSoft Inc. and Excel XP for Windows on personal computer using parametric and non-parametric methods of calculation.

Results of the study and their discussion. Clinical and anamnestic features of the development of acetone syndrome in children are presented in the table.

Clinical-anamnestic indices of the comparison groups (M±m)

Clinical and anamnestic indices	Clinical groups		P
	I (n=25)	II (n=13)	
The frequency of the acetonemic syndrome per year	1,72±0,2	1,25±0,1	P< 0,05
Birth weight (kg)	2,9±0,5	3,3±0,3	P> 0,05
Duration of breastfeeding (months)	9,2±2,1	4,7±0,9	P< 0,05
Infectious index (un.)	0,3±0,3	0,5±0,4	P> 0,05
Allergic anamnesis (un.)	0,32±0,1	0,1±0,04	P< 0,05
BMI (kg/m ²)	15,7±3,1	16,4±3,5	P> 0,05

The tendency of excessive body weight at birth and on the moment of examination of children from the group with severe ketosis was found ($p>0,05$), as well as higher infectious index compared with the group having moderate ketosis (0,5 and 0,3 respectively, $p>0,05$).

Acetonemic conditions occurred more often during a year in children from I group, and compromised individual allergic anamnesis was three times as often as compared with II group ($p<0,05$). Lower indices of ketonuria were peculiar for children who were breastfed longer (9,2 months on an average compared with 4,7 months in II group, $p<0,05$). It should be mentioned specially that lower indices of ketosis were characteristic for children breastfed reliably longer. Maintenance of breastfeeding during the first year of life is known to be of great importance for the formation of regular metabolism and less probability of acetonemic syndrome development [2]. Analyzing anamnestic data we have not found any reliable differences by the indices of perinatal anamnesis.

In the group of children with moderate ketosis hypotonic forms of gallbladder dysfunction prevailed against the background of bile thickening. In the group of children with severe ketosis chronic gastroduodenal pathology was found reliably more often associated with pronounced painful and dyspeptic syndromes.

Conclusion. Therefore, a number of clinical-anamnestic findings, in particular, gastroduodenal pathology, higher infectious index, early transition to bottle/formula feeding,

high body mass indices available, are substantial risk factors provoking more pronounced and severe acetonemic syndrome in children with digestive pathology. Consideration of clinical-anamnestic peculiarities of acetonemic syndrome in children enables to verify severity of the disease in time with the following determination of therapeutic tactics and preventive measures.

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