

# Early Detection and Correction of Lactase Deficiency in Newborns

Fayzullayeva Xilola Baxronovna<sup>1</sup>, Kim Oksana Vladislavovna<sup>1</sup>, Khazratkulova Mashkhura Ismatovna<sup>2</sup>

<sup>1</sup>Assistants of the Department of Biochemistry, Samarkand State Medical University, Samarkand, Uzbekistan

<sup>2</sup>Department of Fundamental Medical Sciences, Tashkent International University of Chemistry, Tashkent, Uzbekistan

**Abstract** This article discusses methods for early diagnosis of lactase deficiency in newborns and approaches to effective correction. The focus is on laboratory analysis of blood and stool samples, along with ultrasound assessment of the gastrointestinal tract. The study was conducted at the Maternity Complex No. 1 in Samarkand. The research group included 30 newborns diagnosed with lactase deficiency, and the control group consisted of 10 healthy newborns. The correction involved the use of the drug "Izicol", and its effectiveness was thoroughly evaluated.

**Keywords** Newborn, Lactase, Glucose, pH, Izicol

## 1. Introduction

Lactase—the enzyme responsible for the digestion of lactose, is one of the most important enzymes involved in the regulation of lactase metabolism [2,3,7]. This condition manifests itself in babies with symptoms such as diarrhea, gas buildup, pain, abstinence from food, slowness in weight gain, and these conditions subsequently negatively affect the growth and development of the child [5,6,11]. According to world statistics, lactase deficiency in neonatal infants is 12-18% (Smith & Brown, 2021) [1,4,8].

Currently, the early detection of lactase deficiency and the development of effective correction methods remain an urgent issue [9,10]. Because by eliminating this condition in time, it is possible to ensure the quality of life and healthy development of babies. The selection of accurate and reliable diagnostic methods, together with laboratory analyzes, makes it possible to assess the effectiveness of corrective therapy [12]. Therefore, this study is relevant in the areas of modern Pediatrics and neonatology.

**The purpose of** the study is to reduce the negative effects of this pathology by early detection of lactase deficiency in newborns, assessment of the effectiveness of clinical and laboratory diagnostic methods and the implementation of corrective therapy using the drug "Izicol".

## 2. Research Materials and Methods

The study was carried out in the maternity complex No. 1 of the city of Samarkand for the period 2024-2025. The study

involved newborns with a total gestational age of 38-40 weeks. The main group included 30 clinically and laboratory-approved lactase-deficient infants, and the control group included 10 clinically healthy infants with the same gestational age.

The following diagnostic methods were used in the study:

Coprogram (general stool analysis) - to determine the activity of digestive enzymes and the residue of lactose in the stool;

pH indicator of feces-to determine the decrease in values in the gastrointestinal environment;

Biochemical analysis of blood-to assess the state of inflammation and metabolism;

UTT (ultrasound examination) of the gastrointestinal system-for the purpose of determining functional and morphological changes.

As a method of Correction, the drug "Izicol" was given in prescribed doses, under the supervision of a doctor, to the infants of the main group, and its effectiveness was assessed.

## 3. Results

According to the results of the study, the following clinical signs were identified in babies with lactase deficiency: multiple liquid diarrhea, abdominal rumbling and rest, refusal to suck and a slowdown in weight gain. No such established cases were observed in the control group. According to the results of the coprogram, the consistency of the general properties of feces: liquid or difficult to form, often observed in a more frothy form of chestnut or yellow color, smell: strongly bitter, with a bitter smell, which indicates that carbohydrates have undergone fermentation

in the intestine. Reaction (pH): acidic ( $5.2 \pm 0.3$ ), which indicates that lactose does not completely break down into glucose and galactose due to lactase deficiency. Microscopic indicators, on the other hand, showed: starch granules (amylorrhea) were ingested in large quantities (76.7% in the main rice, 10% in the control rice), which means that carbohydrates are not fully absorbed.

Colon flora: signs of enzymatic dysbiosis showed an increase in the number of enzymatic bacteria (Bifidobacterium, Lactobacillus) (70% in the main group, 10% in the control group). Under the influence of an acidic environment, the activity of large gas bubbles and microflora increased. According to the chemical changes in the coprogram, reducing substances (reducing substances): positive (+) or (++), (83.3% in the main group, 0% in the control group) that is, lactose or its monomers (glucose, galactose) were identified in the feces. Fats in the Sudan test: slightly increased (26.7% in the main group, 0% in the control group), since the main violation was observed in carbohydrate metabolism (Table 1). Macroscopic appearance stool size: increased (predisposition to polyphecaly), frothy appearance: due to so sababli formed in the fermentation of lactose. In the control group, these indicators were in the normal range.

According to the results of this table, it was found that the main group does not completely break down carbohydrates and the fermentation process is increased.

Lactase deficiency is characterized by a violation of lactase-glucose-galactose hydrolysis as a result of a complete or partial decrease in the enzyme  $\beta$ -galactosidase (lactase) in the intestinal mucosa. This affects carbohydrate metabolism, electrolyte balance, and energy homeostasis. Glycemic changes in tissues during hypoglycemia, that is, hypoglycemia caused by lactase deficiency, lead to impaired synthesis of glucose and galactose, which leads to a decrease in blood glucose levels. This affects carbohydrate metabolism, electrolyte balance, and energy homeostasis. Glycemic changes in tissues during hypoglycemia, that is, hypoglycemia caused by lactase deficiency, lead to impaired synthesis of glucose and galactose, which leads to a decrease in blood glucose levels. As a result, blood glucose levels are low ( $3.1 \pm 0.4$  in the main cluster  $4.7 \pm 0.3$  in the control cluster). In this case, it was manifested by energy deficiency in infants, lethargy, apathy and a slowdown in weight gain. And changes in the electrolyte and water-salt balance are manifested by the loss of water against the background of osmotic diarrhea and fluid loss in biochemical analyzes

hyponatremia( $130 \pm 3.5$ ), hypokalemia( $3.4 \pm 0.3$ ), osmotic diarrhea. Acid-base balance violation occurs in the form of metabolic acidosis (pH.,  $\text{HCO}_3^-$  ↓), when unfermented lactose is converted into milk( $3.9 \pm 0.5$ ) and acetic acid under the influence of bacteria in the intestine, as these acids are absorbed and lower the blood's pH. In blood gas Analyses: pH:  $< 7.35$ , BE (base excess): negative  $\text{HCO}_3^-$  ( $16 \pm 1.8$ ),  $\text{PCO}_2$ : we can see partially low (at the expense of respiratory hyperventilation) during compensation. In biochemical analysis of the blood, the main group shows signs of inflammation— hypoproteinemia with relative increases in s-reactive protein ( $8.2 \pm 1.1$ ) and neutrophil levels — as a result of chronologically persistent diarrhea and absorption disorders, albumin decreased ( $33.5 \pm 1.7$ ) (Table 2). The UTT examination found that infants with lactase deficiency have mild agitation of the intestinal walls and increased peristaltic activity.

These indicators indicate that the energy and water-salt balance is disrupted due to enzyme deficiency.

The drug "Isicol", used for correction, after 7 days of treatment, has led to a significant improvement in clinical signs. "Isicol" is a biologically active additive that contains the enzyme lactase ( $\beta$ -galactosidase). Its main function is to facilitate digestion by breaking down lactose, the main disaccharide in milk, into its components glucose and galactose. Due to the insufficient production of this enzyme in the body in babies with lactase deficiency, lactose is subjected to the fermentation process in the intestines, without exposure, causing symptoms such as liquid diarrhea, abdominal rest, colic. Izicol acts as a temporary "substitute" for the missing lactase enzyme by operating directly in the small intestine when taken orally. In this case: lactose is completely broken down and the body is able to apply it; fermentation and gas formation in the intestine are reduced; symptoms such as liquid diarrhea, rest, abdominal pain, refusal to eat quickly disappear; fluid loss in the body decreases and normal digestion is restored; long-term use improves abdominal rest and attitude to food.

In our study, 30 lactase deficient infants were given Isicol for 7-10 days, achieving the following effectiveness: 60-70% decrease in symptoms after 5 days; almost loss of clinical signs after 7-10 days; normalization in stool analyzes (pH, fats, unmotivated components); improvement in the dynamics of food intake and weight gain (Table 3). These drugs have high clinical significance and contribute to the correction of symptoms and functionality of lactase deficiency.

**Table 1.** Results of coprograms in research groups

Score	Main group (n=30)	Control (n=10)	p
fecal masses pH	<b>5,2 ± 0,3</b>	<b>6,8 ± 0,2</b>	<b>&lt;0,001</b>
Reducing agents positive (%)	<b>83,3%</b>	<b>0%</b>	<b>&lt;0,001</b>
Starch granules (amylorrhea)	<b>76,7%</b>	<b>10%</b>	<b>&lt;0,01</b>
Precipitation (Sudan test)	<b>26,7%</b>	<b>0%</b>	<b>&lt;0,05</b>
Flora enzymatic bacteria growth	<b>70%</b>	<b>20%</b>	<b>&lt;0,01</b>

**Table 2.** Research biochemical indicators of blood in groups

Score	Main group (n=30)	Control (n=10)	p
Glucose (mmol/l)	3,1 ± 0,4	4,7 ± 0,3	<0,001
Sodium (mmol/l)	130 ± 3,5	138 ± 2,4	<0,01
Potassium (mmol/l)	3,4 ± 0,3	4,2 ± 0,2	<0,01
HCO <sub>3</sub> - (mmol/l)	16 ± 1,8	22 ± 1,2	<0,001
Lactate (mmol/l)	3,9 ± 0,5	1,8 ± 0,3	<0,001
Albumin (g/l)	33,5 ± 1,7	38,6 ± 1,4	<0,01
CRP (mg / l)	8,2 ± 1,1	3,1 ± 0,9	<0,05

**Table 3.** Effectiveness of "Izicol" therapy

Indicator	before treatment	after 5 days	after 10 days	p
Liquid diarrhea	5,2 ± 0,6	2,1 ± 0,4	0,8 ± 0,3	<0,001
Have abdominal rest (%)	80%	36%	10%	<0,001
Fecal pH	5,2 ± 0,3	5,8 ± 0,2	6,4 ± 0,2	<0,01
Weight gain (G / week)	80 ± 10	130 ± 15	180 ± 12	<0,01
Complete loss of symptoms (%)	—	60%	93,3%	<0,001

## 4. Conclusions

The results of the study confirm that early detection and effective correction of lactase deficiency in newborns was successfully carried out. Coprogram and stool pH analysis are important in early detection of lactase deficiency. Hypoglycemia, hyponatremia, and lactatemia are major biomarkers in blood analysis. The drug "Izicol" led to a reliable improvement in clinical and laboratory indicators ( $p < 0.05$ ). The drug "Izicol" has shown high efficacy in reducing symptoms associated with lactase deficiency. Its mechanism of action is based on the replacement of the enzyme lactase, which is lacking in the small intestine, which helped to improve the digestive process of babies. For this reason, "Izicol" can be widely used on the basis of medical recommendations. In educational institutions and medical centers, it is recommended to regularly study the pH indicators of the coprogram and stool for early detection of lactase deficiency. It is also necessary to conduct more extensive research in order to monitor and confirm the effectiveness of drugs such as "Izicol".

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