POSTNATAL MORPHOGENESIS OF THE STOMACH OF OFFSPRING BORN TO MOTHERS WITH DIABETES

Bunyodjon Mamatvaliyev son of Rahmonali
Doston O'ktamaliyev son of Xukumatali
University of Business and Science "Lecturers in Human Anatomy at the Department of Medicine",
Rahimova Fotima daughter of Vohidjon
Student of the "University of Business and Science", Faculty of General Medicine, Group 25-13,
Toshaliyeva Husnidaxon daughter of Mamasoli
Student of the "University of Business and Science", Faculty of General Medicine, Group 25-13
Adashboyeva Moxlaroy daughter of Maqsudjon
Student of the "University of Business and Science", Faculty of General Medicine, Group 25-26
medicbmorpholog@gmail.com
dostonoktamov1111@gmail.com
rahimovafotima7800@gmail.com
madaminovahusnidaxon14@gmail.com
adashboyevmohlaroy@gmail.com
https://doi.org/10.5281/zenodo.17951737

Abstract:

This article presents the results of the following study, which was conducted to study the postnatal morphogenesis of the stomach of children born to mothers with diabetes.

The purpose of the article is increasing awareness of not only neonatologists, but also pediatricians of the discussed problem, assisting patients in all periods of childhood. The article summarizes the up-to-date data on the state of health of children born to mothers suffering from diabetes mellitus of various types, including gestational diabetes. The causes of occurrence of malformations are described, the risk factors for children born with fetopathy are presented. Data are presented on the dynamics of development and manifestation of diseases of various organs and systems in the prospective follow-up from birth to 15 years, which is currently insufficiently focused on. It is concluded that prevention and treatment at the early stages of the disease will not only improve the quality of life of this cohort of children, but also significantly reduce the disability of the entire child population.

Key words: children of mothers with diabetes, gestational diabetes, pregnancy diabetes mellitus, diseases of civilization, pregnancy, pathophysiology, physiology, pathology, molecular

Introduction:

Diabetes mellitus is one of the common diseases of civilization. Its frequency in the population has now reached the level of epidemic diseases, amounting to 1–8.6%. According to statistical studies, every 10–15 years the number of people with diabetes doubles, thus diabetes becomes a medical and social problem. In 75–85% of women suffering from diabetes, pregnancy occurs with various complications. If the mother has type 1 diabetes, up to 75% of newborns have diabetic embryofetopathy. In gestational diabetes mellitus, fetopathy occurs in only 25% of newborns. The incidence of diabetic fetopathy in boys and girls is approximately the same. The frequency of isolated defects is 6–8%, which is 2–3 times higher than in children from mothers without diabetes. Despite the widespread introduction of new highly purified

types of insulin, methods of self-control and monitoring of the state of carbohydrate metabolism, the use of human insulins obtained by genetic engineering technology, and the organization of specialized obstetric departments, perinatal mortality in diabetes mellitus remains high and is for type 1 diabetes 202‰, type 2 47‰, gestational diabetes 95‰, and early neonatal mortality is 3–4 times higher than the corresponding figure in the general population.

The main part

Newborns from mothers with diabetes, despite their large body weight, are considered premature and require special care. In the first hours of life, attention should be paid to identifying and controlling respiratory disorders, hypoglycemia, acidosis and central nervous system damage. In 50% of newborns from mothers with diabetes mellitus, dysglucosemia syndrome is observed in the early neonatal period. The manifestations of this syndrome in the form of hypo- and hyperglycemia depend on the severity and degree of compensation of the mother's underlying disease, the presence of complications of pregnancy (preeclampsia) and childbirth (trauma), and the nature of adaptation disorders in newborns in the early postnatal period. Children with diabetic fetopathy adapt much worse in the early neonatal period, which is expressed in the development of conjugation jaundice, toxic erythema, significant loss of body weight and slow recovery.[4]

Traditionally, a sufficient number of studies have been devoted to studying the condition of the fetus and newborns from mothers with diabetes. A number of carbohydrate, water-electrolyte, and endocrine disorders that determine the course of the neonatal period have been identified. Disorders of the respiratory tract and cardiovascular system, brain, and kidneys in the fetus and newborn are described. At the same time, the literature practically does not discuss the health status of children in subsequent age periods. We found only a few studies concerning follow-up observations of this group of children. While the study of follow-up makes it possible to evaluate the results of the efforts that doctors make in the pregravid, gestational, early neonatal and postnatal periods.[5]

For children born to mothers with diabetes, in addition to observation by a local pediatrician, consultations with a neurologist (starting from 1 month of life), as well as an endocrinologist, are recommended not only in the first year of life, but also in subsequent periods of childhood, since the frequency of somatic and neurological pathologies in these children are significantly higher than in the general population. The optimal follow-up periods are 3, 6, 9, 12 months of life, then once a year.[6]

Since a child at each age stage of his life appears in a special morphological, physiological and psychological quality, it is advisable to assess the health status of children by periods of childhood (infancy, early age, preschool, school and adolescence). According to V.I. Krasnopolsky et al., CNS pathology of varying severity acts as a leading health disorder in infants [10]. In the first year of life, almost all children are observed by a neurologist for perinatal damage to the central nervous system of hypoxic or hypoxic-traumatic origin. The relationship of this fact with the state of chronic fetal hypoxia, which develops during pregnancy due to impaired fetoplacental circulation, as well as the high probability of acute hypoxia and trauma to a large fetus during impaired labor, is obvious. Redistribution of iron content and depletion of brain tissue also play a certain role. Most often (70.2%) children are diagnosed with movement disorder syndrome, which in most cases manifests itself as muscular

dystonia or hypotension. Muscle tone disorders affect the delay in age-related motor development and the formation of motor skills (noted in 41.1% of children in the second half of life).[7]

45.4% of infants have gastrointestinal disorders, most often caused by functional disorders (regurgitation, colic) and dysbacteriosis. This is based on the pronounced morphofunctional immaturity of the fetus at the time of birth. Manifestations of rickets are observed with approximately the same frequency, which can be explained by functional immaturity against the background of a high metabolic rate at this age.

The following study was conducted in order to study the postnatal morphogenesis of the stomach of children born to mothers with diabetes.

The purpose of the study. Study of postnatal morphogenesis of the stomach of offspring born to mothers with diabetes.

Materials and methods of research. Experimental studies were carried out on 60-70 adult laboratory white female rats (weighing 160-180 g) and their offspring. Experimental animals are kept in a normal vivarium diet.

Alloxan citrate buffer at a dose of 40 mg/100 g was administered to rats by intra-abdominal injection to create an experimental diabetes model in experimental animals. The rats of the control group were injected with isotonic solution in the same amount and ratio. Analysis of glucose levels in blood and urine of rats was performed on ChemWell 2910 Combi automatic biochemical and enzyme immunoassay analyzer.

The offspring of the animals were studied on 7-14 days of postnatal life.

Research results. Mother's diabetes had a negative effect on the digestive system of the offspring. These changes were also reflected in the early external general developmental signs of the primary newborn rat pups: despite the fact that the rat pups were born larger and heavier compared to the control littermates, the rat pups had migration of the auricles, no hearing. The processes such as the opening of the larynx, the appearance of a fur coat on the skin, the attempt to stand up and its implementation appeared relatively 2-3 days later. Histological examination of meda preparations of 3-7-day-old rat pups showed that the cells of the surface and pits of the medulla are prismatic, and the morphometric parameters of the medullary pits are lower than the morphometric parameters of the control group animals. Swelling, infiltration with mononuclear cells was observed in the gastric mucosa. All parts of the stomach showed atrophic changes, lymphoplasmacytic inflammatory infiltration and hypertrophy of the glands of the antral region. The total number of cells in the fundal area of the stomach is reduced.[8]

Principal cells were not identified. The architecture of the fundal glands is not clearly visible. Thinning of the serous-muscular layer of the stomach and infiltration with mononuclear cells was found .

Thus, morphological and morphometric studies of the offspring born from female rats with diabetes (D) in the early postnatal periods showed that, despite their relatively large mass, the offspring lag behind in general physical development. Morphofunctional deficiencies are observed in all layers of the stomach.

Conclusions:

1. Diabetes mellitus in the mother negatively affects the morphofunctional state of internal organs of the offspring.

2. Despite the large mass of offspring born to mothers with QD (macrosomia), deficiencies in the morphofunctional state of their stomach develop.

3. Offspring born to mothers with diabetes should be monitored by a dispensary, and dynamic observation and treatment-prophylactic measures should be carried out in order to prevent metabolic syndromes.

References:

1.American Diabetes Association Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes—2018. Diabetes Care. 2018;41:S13–S27. doi: 10.2337/dc18-S002. [PubMed] [CrossRef] [Google Scholar]

2.International Diabetes Federation . IDF Diabetes Atlas. 8th ed. IDF; Brussels, Belgium: 2017. [Google Scholar]

3.Feig D.S., Moses R.G. Metformin Therapy during Pregnancy Good for the goose and good for the gosling too? Diabetes Care. 2011;34:2329–2330. doi: 10.2337/dc11-1153. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

4.Camelo Castillo W., Boggess K., Stürmer T., Brookhart M.A., Benjamin D.K., Jonsson Funk M. Association of Adverse Pregnancy Outcomes with Glyburide vs Insulin in Women with Gestational Diabetes. JAMA Pediatr. 2015;169:452–458. doi: 10.1001/jamapediatrics.2015.74. [PubMed] [CrossRef] [Google Scholar]

5.Киселева М.К., Байрамова И.Х. Алгоритм ведения беременности и родов у пациенток с сахарным диабетом I типа. Материалы VIII Российского форума «Мать и дитя». Москва 2006; 110–111. (Kiseleva M.K., Bayramova I.H. Algorithm for management of pregnancy and labor in patients with type I diabetes mellitus. Materials of VIII Russian forum «Mother and child.» Moscow 2006; 110–111. (in Russ)

6.Неонатология. Национальное руководство. Под ред. Н.Н. Володина. М: ГЭОТАР-Медиа 2007; 848. [Neonatology. National guide. N.N. Volodin (ed.). Moscow, GEOTAR-Media 2007; 848. (in Russ)]

7.Шабалов Н.П. Неонатология. Учебное пособие. М: «МЕДпресс-информ» 2009; 1248. [Shabalov N.P. Neonatology. Training guide. Moscow, MEDpress-inform 2009; 1248. (in Russ)]

8.Reece E.A., Homko C.J. Infant of the diabetic mother. Semin Perinatol 1994; 18 (5): 459–469.

9.Hillier A.T., Vesco K.K., Whitlock E.P., Pettitt D.J., Pedula K.L. et al. Screening for Gestational Diabetes Mellitus. Evidence Syntheses, No. 60. Oregon Evidence-based Practice Center. Rockville: Agency for Healthcare Research and Quality (US); 2008. https://www.ncbi.nlm.nih.gov/books/NBK43368/

10.Mills J.L. Malformations in Infants of Diabetic Mothers. Birth Defects Res A Clin Mol Teratol 2010; 88 (10): 769–778. DOI: 10.1002/bdra.20403

11.Краснопольский В.И., Логутова Л.С., Петрухин В.А., Аксенов А.Н., Башакин Н.Ф., Троицкая М.В., Бурумкулова Ф.Ф. и др. Динамическое наблюдение за детьми, родившимися у матерей с различной эндокринной патологией. Рос вестн акушера-гинеколога 2005; 1 (5): 74–77. [(Krasno- polsky V.I., Logutova L.S., Petrukhin V.A., Aksenov A.N., Bashakin N.F., Troitskaya M.V., Burumkulova F.F. et al. Dynamic monitoring of children born from mothers with various endocrine pathologies. Ros vestn akushera-ginekologa 2005; 1 (5): 74–77. (in Russ)]

12.Persson M., Pasupathy D., Hanson U., Norman M. Birth size distribution in 3,705 infants born to mothers with type 1 diabetes: a population-based study. Diabetes Care 2011; 34–36: 114512.
13.Syed M., Javed H., Yawar Y.M., Bhutta Z.A. Effect of screening and management of diabetes during pregnancy on stillbirths. BMC Public Health. 2011; 11(Suppl 3): S2. DOI: