



IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY



VOLUME :

Special Issue

Print / Issue Publication Date: 15-Sep-2020



ISSN : 2455-2143



Indexed In



WWW.IJEAST.COM

editor@ijeast.com

FEATURES OF NEUROPHYSIOLOGICAL DEVELOPMENT OF NEWBORNS IN PERINATAL HYPOXIC INJURY OF THE CENTRAL NERVOUS SYSTEM

Igamova S.S.
Samarkand Medical
Institute, Samarkand,
Uzbekistan

Djurabekova A.T.
Samarkand Medical
Institute, Samarkand,
Uzbekistan

Shamsiev J.A.
Samarkand Medical
Institute, Samarkand,
Uzbekistan

Abdullayeva N.N.
Samarkand Medical
Institute, Samarkand,
Uzbekistan

Abstract. The causes of PI (perinatal injury) of the central nervous system of hypoxic-ischemic genesis in newborns are diverse, it is not always possible to isolate the most important factors from insignificant ones. The maximum number of observed risk factors are maternal ones: the mother's age, occupational hazards, the outcome of the previous pregnancy, concomitant diseases, diseases during pregnancy, complications during pregnancy.

The study was based on clinical and laboratory examination of 266 newborns with PI of the central nervous system of hypoxic genesis in the period from 2018 to 2019. The bases for the study were: the Department of Neurology and Neurosurgery of the Samarkand State Medical Institute, the Department of Pediatric Neurology and the Maternity Complex of the 1-Clinic of the SamMI, the Department of Reanimation and Intensive Care of Newborns of the 2-Clinic of the SamMI, Samarkand regional branch of the Republican Center for Social Adaptation of Children (RCSACSB).

The work is based on the study of the results of a dynamic pro- and retrospective study of 266 newborns. Among the observed patients, boys accounted for 144 (54.14%), girls - 122 (45.86%). The studies were carried out in the age periods of 5-7 days, 3, 6, 9 and 12 months.

The surveyed children were divided into two representative groups, by age and gender.

- the main group (MG) consisted of 161 newborns with a verified diagnosis of PI of the central nervous system of hypoxic genesis. Depending on the severity of the perinatal lesion: there were 81 (50.3%) newborns with a mild degree of PI of the central nervous system of hypoxic genesis, with a moderate degree - 65 (40.4%), with a severe degree - 15 (9.3%) newborns;
- the comparison group (GC) included 105 children, the neonatal period and up to a year was studied retrospectively on the basis of the archived data of the medical records of the inpatient, where: 54 (51.4%) newborns with PI

of the central nervous system of hypoxic genesis were mild; with an average degree - 42 (40.0%), with a severe degree - 9 (8.6%) newborns;

- As a control of HIF-1 α parameters and RTC morphometry, the results of examination of 30 practically healthy newborns were used.

To take into account the anamnestic data of mothers, a special card was developed for monitoring and including the results of examination of patients with PI of the central nervous system.

Clinical observations included a comprehensive analysis of the health of mothers of children of the groups examined - the study of anamnesis: social, obstetric, somatic status, the course of pregnancy and childbirth (history of childbirth, transient epicrisis), somatic and neuropathological examination of patients.

The examination of patients was carried out according to generally accepted standards, methods of laboratory research (general analysis of urine, blood, biochemical blood tests and determination of the level of calcium and according to indications).

- clinical and statistical examination (analysis of reporting documentation, study of children's health);

At the initial period of the dissertation work, we retrospectively studied the state of the patient's health level.

In the next period, the factors influencing the state of health of patients were investigated, the mother's history, obstetric, pregnancy and its course, extragenital pathology, and the level of perinatal risk were taken into account.

The main task at the first stage of the research was to identify risk factors for the development of PI of the central nervous system and their assessment, at the second stage - its prediction and complex treatment.

To determine the severity of the course of the disease, we used the classification of PI of the central nervous system in newborns according to the N.V. Sarnat and M.S. Sarnat.

We have analyzed the maternal risk factors for the development of PI of the central nervous system in children: the age of the mother, the harmfulness of the mother's profession, the outcomes of previous pregnancies, concomitant diseases, diseases suffered during pregnancy, complications of this pregnancy.

During pregnancy, there is a possibility of various factors affecting the fetus, leading to sad consequences. Somatic diseases of the mother during pregnancy also have a negative impact on the health of the newborn. We analyzed the nosological spectrum of somatic pathology.

in the group of healthy children, somatic diseases were not detected in 66.67% of women, and in 33.33% of mothers various diseases were revealed. Where as in the group of children with PI of the central nervous system, only 19.17% of women during this pregnancy had no somatic pathology. In 80.83% of cases, mothers of children with PI CNS had diseases of various organs and systems. Among the somatic diseases of mothers, anemia prevailed at 80.83%. In women of CG children, anemia was diagnosed in 33.33% of cases. In second place in terms of the incidence of diseases in mothers of children with PI of the central nervous system were specific bacterial and viral infections (TORCH infection) in 18.8% of cases. Diseases of the gastrointestinal tract during pregnancy of mothers of newborns with PI of the central nervous system are established in 13.33% of cases, such as cholecystitis, chronic gastritis, stomach ulcer or duodenal ulcer disease. Diseases of the cardiovascular system (arterial hypertension, vegetative-vascular dystonia, congenital heart disease) were observed in 13.53% of cases in women of children with PI of the central nervous system. Pathology of the visual analyzer (myopia and astigmatism) 11.28% of cases. Diseases of the endocrine system such as subclinical hypothyroidism, multinodular goiter, autoimmune thyroiditis, occurred in 11.65% of cases. Diseases of the upper respiratory tract (tracheitis, pharyngitis, bronchitis) occurred in 6.77% of cases, and kidney pathology (chronic pyelonephritis, polycystic disease, urolithiasis) - 6.01%.

A burdened history (two or more somatic pathologies) was noted in women of the older age category. All this testifies to the negative impact of exacerbation of somatic diseases on the condition of the fetus and mother.

The most dangerous is a rotavirus infection during pregnancy, which aggravates its course and creates a risk of intrauterine infection of the fetus. More than half of pregnant women from the group of children with PI of the central nervous system have had a rotavirus infection during pregnancy. An analysis of the comparison of the incidence of acute inflammatory diseases in women of both groups showed that the relationship between factorial and effective signs is statistically significant ($\chi^2 = 74.789$; critical $\chi^2 = 13.277$; $p < 0.001$).

The obstetric and gynecological history was burdened in women who gave birth to healthy newborns in 16.67% of cases, while in mothers of children with PN of the

central nervous system in 69.55% of cases, that is, 4 times higher. The leading places (33.08% against) were taken by spontaneous miscarriages, undeveloped pregnancy. Infectious gynecological diseases before and during pregnancy were recorded in 10.9% of women (salpingo-oophoritis, colpitis, ureaplasmosis, trichomoniasis, etc.). Uterine fibroids were diagnosed in 10.15% of women. Other gynecological pathology was much rare ($\chi^2 = 48.156$; critical $\chi^2 = 18.475$; $p < 0.01$).

In 77.44% of women from the group of children with PN of the central nervous system, pregnancy took place with toxicosis, the threat of miscarriage was registered in 39.47% of mothers in the first trimester of pregnancy, in the third trimester, 28.57% of pregnant women showed a tendency to early childbirth. Gestational diabetes mellitus was detected only in the third trimester in 7.52% of cases. Gestational pyelonephritis was found in 13.91% of women ($\chi^2 = 8.382$; critical $\chi^2 = 14.067$; $p > 0.05$).

Determination of risk factors for the development of PI CNS in newborns is an important clinical issue. Its decision will allow to determine in a timely manner the choice of adequate tactics for treating newborns with PI of the central nervous system.

To study the risk factors for the development of PI CNS, a study of 266 case histories of newborns with an established diagnosis of PI CNS and 30 case histories of healthy children was carried out, which was based on the determination of "predisposing" and "provoking" factors.

Determination of risk factors for the development of PI CNS in newborns is an important clinical issue. Its decision will allow to determine in a timely manner the choice of adequate tactics for treating newborns with PI of the central nervous system.

To study the risk factors for the development of PI CNS, a study of 266 case histories of newborns with an established diagnosis of PI CNS and 30 case histories of healthy children was carried out, which was based on the determination of "predisposing" and "provoking" factors.

As a result of the analysis, from the studied possible risk factors for the development of PI of the central nervous system in a newborn, it was found that the most significant conditionally strong indicators influencing the formation of the PI of the central nervous system in children were:

- anemia ($\phi = 0.336$),
- somatic diseases of the mother 2 or more ($\phi = 0.336$),
- mother's age > 31 years ($\phi = 0.391$),
- toxicosis during pregnancy ($\phi = 0.426$),
- acute inflammatory diseases during pregnancy ($\phi = 0.499$).

In accordance with the objectives of our study, the APGAR scale was used to accurately verify the severity and severity of the pathology of cerebral circulation.

An analysis of children with PI CNS was carried out according to the APGAR scale at 1 and 5 minutes of life. At 1

minute of birth, 59.4% of children were assessed using the APGAR scale at 4 or 5 points. Patient scores on the APGAR

scale in the 1st and 5th minutes of life are shown in Figure 1.

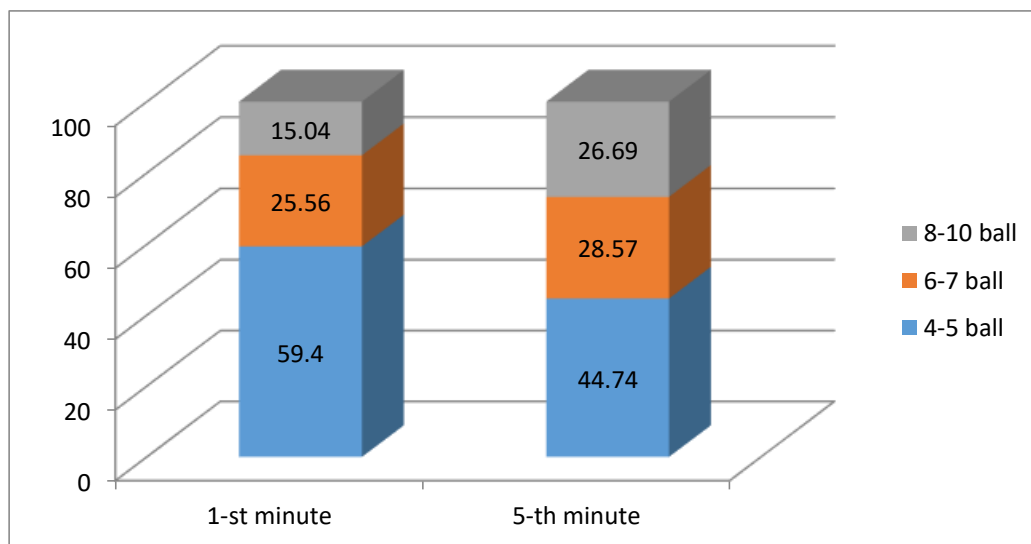


Fig 1. Analysis of newborns with PI CNS according to APGAR scale at 1 and 5 minutes of life.

By the 5th minute after birth, 44.74% of children had an APGAR score of 4-5 points, i.e. this indicator decreased by 1.3 times. Whereas in 28.57% of cases, 6-7 points were verified, with an increase in dynamics of 1.1 times. And children with an assessment on a scale of 8-10 points by 5 minutes increased 1.8 times from 15.14 to 26.69.

The physical development of the newborn was carried out with the assessment tables of the percentile type (Demytyeva G.M., 2000).

In 111 (81.62%) newborns with a mild severity of PI of the central nervous system, development is harmonious, in 25 (18.38%) the proportions of the body associated with excessive nutrition were somewhat disturbed, which leveled off by the 3rd month.

In 54 (50.94%) newborns with moderate to severe degree of PI of the central nervous system, the body size coincided with the weight, which indicated the harmonious development of their development. Disharmony of physical development was observed in 49 (46.23%) newborns with moderate to severe degree and sharply disharmonious in 3 (2.83%). Newborns with a severe degree generally had disharmonious development - 14 (58.33%) and sharply disharmonious development - in 10 (41.67%) newborns.

Disharmonious development in severe PI of the central nervous system prevailed 3.2 times compared with mild ($\chi^2 = 89.613$; critical $\chi^2 = 9.21$; $P_{I-III} < 0.001$) and 1.3 times compared with moderate to severe degree. The sharply disharmonious development in children with a severe degree was 14.7 times higher than the medium-severe degree ($\chi^2 = 42.334$; critical $\chi^2 = 9.21$; $P_{II-III} < 0.001$).

Summary. As a result of the analysis, from the studied possible risk factors for the development of PI of the central nervous system in a newborn, it was found that the pronounced factors (conditionally strong), expressing a huge effect on the PI of the central nervous system, included: anemia ($\phi = 0.336$), somatic diseases of the mother 2 and more ($\phi = 0.336$), mother's age > 31 years ($\phi = 0.391$), toxicosis during pregnancy ($\phi = 0.426$), acute inflammatory diseases during pregnancy ($\phi = 0.499$).

There was a discrepancy between the severity of neurological symptoms according to the Sarnat & Sarnat classification with the data of point assessments both at the 1st and 5th minutes on the APGAR scale in most of the examined patients.

Harmonious physical development was noted in 165 (62.03%) children with PI of the central nervous system, disharmonious - in 88 (33.08%), sharply disharmonious - in 13 (4.89%).

The analysis of adaptation indicators showed that there is a tendency for their growth depending on the severity. Neonates with moderate to severe and severe degree had high rates of adaptation disorder.

The adaptive characteristics of a newborn baby depend on many factors, such as the course of pregnancy, birth complications and general condition at the time of birth. Violations of the NA should not be based on a single symptom. The adequacy of the assessment of each neurological symptom in newborns with the analysis and comparison of symptom complexes, various syndromes should be carried out, and it is imperative to take into account the somatic, concomitant diseases of the child.

References:

1. Alberta Infant Motor Scale: Reliability and Validity When Used on Preterm Infants in Taiwan Suh-Fang Jeng Kuo-Inn Tsou Yau Li-Chiou Chen Shu-Fang Hsiao Physical Therapy. Volume 80. Number 2. February 2000 168-178 c.
2. Alimović S, Katušić A, Mejaški-Bošnjak V. Visual stimulations' critical period in infants with perinatal brain damage // *Neuro Rehabilitation*. – 2013. – Vol.33(2). – P. 251-5. doi: 10.3233/NRE-130952.
3. HIF-1 alpha inhibition ameliorates neonatal brain damage after hypoxic-ischemic injury Wanqiu Chen & Vikram Jadhav & Jiping Tang & John H. Zhang *Acta Neurochir Suppl* (2008) 102: 395–399 Springer-Verlag 2008
4. Semenza G.L., Wang G.L. A nuclear factor induced by hypoxia via de novo protein synthesis binds to the human erythropoietin gene enhancer at a site required for transcriptional activation // *Molecular and Cellular Biology*. - 2012. - №12. - P. 5447–5454.
5. Sorci, G. S100B protein, a damage-associated molecular pattern protein in the brain and heart, and beyond // *Cardiovasc. psych. and neurol.* – 2010. – 13 p
6. Steiner, J. Evidence for a wide extra-astrocytic distribution of S100B in human brain / J. Steiner [et al.] // *BMC Neurosci*. –2010. – № 8. – P. 8.
7. Titomanlio L, Fernández-López D, Manganozzi L, Moretti R, Vexler ZS, Gressens P. Pathophysiology and neuroprotection of global and focal perinatal brain injury: lessons from animal models // *Pediatr Neurol*. – 2015. - Vol.52(6). – P. 566-584. doi: 10.1016/j.pediatrneurol.2015.01.016.
8. Very Early Brain Damage Leads to Remodeling of the Working Memory System in Adulthood: A Combined fMRI /Tractography Study // *J Neurosci*. 2015 Dec 2;35(48):15787-99. doi: 10.1523/JNEUROSCI.4769-14.2015.
9. Vytautas Basys, Nijolė Drazdienė, Nijolė Vezbergienė, Jelena Isakova Perinatal injury of the central nervous system in Lithuania from 1997 to 2014 *Acta medica lituanica*. 2016. Vol. 23. No. 4. P. 199–205
10. Wagner S.J. From placenta to podocyte: vascular and podocyte pathophysiology in preeclampsia / S.J. Wagner, I.M. Craici, J.M. Grande et al. // *Clin. Nephrol*. – 2012. – V. 78. – P. 241–249.
11. Halimbetov G.S. Consequences of perinatal lesions of the nervous system in children, clinical and biochemical parallels. - Tashkent, 2018. -- S. 12-16.
12. Shamansurov Sh.Sh., Sokhieva N.E., Uzakova Ch.A. Clinical and anamnestic features of the consequences of perinatal damage to the nervous system in young children in rural areas. // *Neurology*. - Tashkent, 2010. - No. 2 (46). - S. 23-25.

IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

ABOUT IJEAST

International Journal of Engineering Applied Science and Technology (IJEAST) is a peer-reviewed, open access journal that publishes high-quality research papers in the field of Engineering, Applied Science and Technology.

IJEAST aims to provide a platform for researchers, academicians, and professionals to share their innovative ideas, research findings, and practical experiences with the global scientific community.

FOCUS AREAS

- Engineering
- Applied Science
- Technology
- Innovation & Development
- Interdisciplinary Studies



PEER REVIEWED

All submissions are rigorously peer reviewed to ensure quality.



OPEN ACCESS

Free and unrestricted access to research for all.



GLOBAL REACH

Connecting researchers and professionals worldwide.



TIMELY PUBLICATION

We ensure a swift and efficient publication process.



For more information, visit our website
www.ijeast.com



INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

✉ editor@ijeast.com

🌐 www.ijeast.com

📍 India



2455-2143