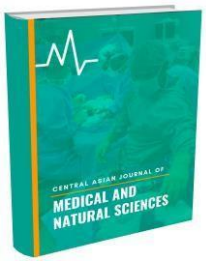

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Article

Study of Physical - Mental Development of Children of the First Year of Life, Born With A Very Low and Extremely Low Body Weight

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Abstract: To study the state of physical and mental development of children of the first year of life born with very low and extremely low body weight. The study included 75 children with body weight at birth from 560 to 1500 g. The gestational age was 24-32 weeks. Depending on body weight at birth, the children were divided into 2 groups. Group 1 included children with a birth weight of up to 1000 g, Group 2 - with a birth weight of 1001 to 1500 g. The results of the study showed that mothers of premature infants showed a high frequency of somatic, gynecological diseases, pathologies of pregnancy and childbirth, which contributed to the development of placental insufficiency and miscarriage. Average indicators of physical development of premature infants at birth corresponded to gestational age. In dynamics, by the end of the neonatal period, indicators of physical development in all groups were significantly lower than in healthy newborn children.

Keywords: Physical Development, Premature Infants, Gestational Age

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1. Introduction

Relevance of the Study. A significant portion of infants born with a birth weight of less than 1500 grams exhibit lower physical and mental development levels in their third year of life compared to full-term infants. Concurrently, delays in weight-for-age indicators in relation to growth at 1, 3, 6, and 15 months of age are inversely correlated with gestational age (Dusick A. et al.; Ehrenkranz R.A. et al.; Embleton N. et al[1].

Research findings indicate that extremely premature infants demonstrate a statistically significant lag in physical development indicators up to 3 months of age. By 24 months of corrected age, subnormal indicators for weight, height, and head circumference were observed in 13% and 17% of children, respectively, with some studies indicating up to 20%[2].

The modern development of neonatology in Uzbekistan allows for the widespread implementation of high-tech methods in daily medical practice for the diagnosis, care, and treatment of very low birth weight and extremely low birth weight infants.

However, the early adaptation period for patients in this category is extremely hazardous and can lead to the development of numerous life-threatening conditions, as well as delayed somatic and neurological complications[3]. In this regard, there is a need to further optimize the care strategy for extremely premature infants. Specifically, it is

crucial to determine the optimal nutritional tactics during the neonatal period to maintain growth rates of physical development indicators in premature infants that are comparable to intrauterine growth (Baibarina E.N., Lenyushkina A.A)[4].

To determine the physical and mental development status of children born with very low and extremely low body weight during their first year of life.

2. Materials and Methods

This prospective clinical study included 75 newborns with birth weights ranging from 560 g to 1500 g and a gestational age of 24 to 32 weeks. All infants were observed during the neonatal period and subsequently monitored throughout the first year of life to assess their physical and mental development[5].

Grouping of Infants

To ensure accurate analysis, the infants were stratified into groups according to their birth weight:

Group 1: Infants with a birth weight up to 1000 g (extremely low birth weight).

Group 2: Infants with a birth weight between 1001–1500 g (very low birth weight).

Group 3: (If included, this group would consist of infants with additional clinical characteristics, but in the available dataset, information was incomplete, so detailed analysis was conducted primarily for Groups 1 and 2)[6].

This stratification was important because infants with extremely low birth weight (≤1000 g) represent the highest risk category, while those weighing between 1001–1500 g generally demonstrate better adaptation but remain vulnerable to growth and neurological complications.

All infants underwent a comprehensive clinical-functional assessment, which included the following components:

- Evaluation of muscle tone (hypotonia, hypertonia, or normotonia)[7].
- Monitoring of unconditioned reflexes (sucking, grasping, Moro reflex, rooting, and stepping reflex).
- Examination of deep tendon reflexes, which provide insight into central and peripheral nervous system maturity.
- Dynamic observation of reflex appearance and persistence to identify early deviations in neurological development[8].
- Conducted using a Philips-480 ultrasound system. Aimed at identifying structural abnormalities, intraventricular hemorrhage, periventricular leukomalacia, and other post-hypoxic complications.
- Repeated examinations were performed at baseline and at follow-up intervals to monitor changes in cerebral structures.

Since reflex evaluation is a critical diagnostic tool in neonatology, the appearance, intensity, and persistence of neonatal reflexes were studied dynamically. This allowed the researchers to:

- Differentiate between physiological immaturity and pathological neurological damage.
- Establish correlations between reflex delays and later cognitive or motor impairments.
- Identify early markers of hypoxic-ischemic encephalopathy.
- Inclusion criteria: newborns with a gestational age of 24–32 weeks and a birth weight between 560–1500 g.
- The study protocol was approved by the institutional ethics committee. Written informed consent was obtained from parents or legal guardians prior to participation. All procedures were carried out in accordance with the Declaration of Helsinki principles for biomedical research involving human subjects.

3. Results and Discussion

The effect of diverse variables on the absorbance intensity on the phenylephrine hydrochloride and the optimum conditions have been selected as follows:

The results of our study indicated a high prevalence of somatic pathology in women across all observation groups. Specifically, anemia, chronic pyelonephritis, and vegetative-vascular dystonia were frequently recorded. A combination of two or more somatic diseases in mothers (reliably, $P<0.01$) was more prevalent in the second observation group (18%)[9].

Gynecological diseases were reliably ($P<0.05$) diagnosed more frequently in women who gave birth in the third group, accounting for 33.3%. In the first and second observation groups, these figures were 12.5% and 25.0%, respectively. Across all observation groups, there was a high frequency of pregnancy termination and the risk of chronic fetoplacental insufficiency, with this pathology being significantly more widespread in women of the third group ($P<0.05$).

The frequency of miscarriage risk across all observed groups was high, with chronic fetoplacental insufficiency, especially in women of the third group, occurring significantly more often ($P<0.05$)[10]. Among the causes of complicated pregnancies, the most prevalent were gestoses in the second half of pregnancy and the risk of early and late miscarriage.

No reliable differences were found between the examined groups regarding gestoses in the second half of pregnancy. However, mild gestosis in women of the first group, combined with hypoxic stress experienced during childbirth, appears to act as a "training" for the fetal organism (Shabalov N.P., Yaroslavsky V.K., Khodov D.A. et al)[11]. Infants born to mothers with severe premature births predominantly had higher birth weights, while combined forms of gestoses exerted a constant damaging effect on the fetus.

In the first group, the risk of miscarriage was observed across all comparable groups. The risk of abortion occurred with approximately the same frequency in all observation groups during the first half of pregnancy[12]. However, the threat of abortion in the second half of pregnancy was more frequently and reliably noted in mothers of the third group.

The severity of somatic pathology was compared between children in the II and III groups. Reliable differences were found in the incidence of respiratory distress syndrome, which was widespread among children in the III group ($p = 0.003$). This is attributed to the higher proportion of extremely premature infants in this group. Conjugated hyperbilirubinemia was also reliably widespread in Group III ($p = 0.04$).

Perinatal damage to the central nervous system was hypoxic-ischemic in nature in all cases. Post-hypoxic damage to the central nervous system, even without intrauterine infection, developed against the background of acute and chronic perinatal hypoxia, as well as intrauterine fetal hypoxia. Infants of mothers with extremely preterm births generally experienced a more severe course, typically associated with mixed forms of gestosis which undoubtedly had a detrimental effect on the fetus.

The risk of fetal loss during the first half of pregnancy occurred with approximately the same frequency in all observation groups[13]. The risk of fetal loss in the second half of pregnancy was recorded with significantly higher statistical reliability in mothers of the third group. Cervical insufficiency was noted in a considerably smaller percentage of women in the first and second groups. In the third group, this diagnosis was made in 25.0% of cases.

The average duration of labor was 11.6±1.2 hours. There were no reliable differences in the duration of labor between the groups. The rate of rapid labor ranged from 12.5% to 17.9%, with no significant differences observed between the groups[14].

Infants born to mothers in all groups were delivered via cesarean section at a high rate (42.9% in the first group, 37.5% in the second group, and 50.0% in the third group). Abruptio placentae (placental abruption) occurred in 8.3% of cases in women from the

second and third groups, necessitating operative delivery. This pathology was not found in mothers of the first group. Tight nuchal cord encirclement (umbilical cord wrapped around the fetal neck) was more common in the first group (21.4%)[15].

The incidence of primary uterine inertia was insignificant across the examined groups. Ultrasound and Doppler examinations revealed signs of fetoplacental insufficiency in pregnant women across the observation groups, indicating unfavorable pregnancy progression. The frequency of this condition ranged from 28.6% in the first group to 58.3% in the third group.

4. Conclusion

Thus, the results of the study demonstrated that mothers of premature infants exhibit a high prevalence of somatic and gynecological diseases, as well as pregnancy and delivery pathologies. These factors lead to fetoplacental insufficiency and the inability to carry the pregnancy to term. The average physical development indicators of premature infants correspond to their gestational age at birth. However, by the end of the neonatal period, physical development indicators in all groups are significantly and reliably lower than those of healthy newborns.

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