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CLINICAL-NEUROLOGICAL AND PARACLINICAL CHARACTERISTICS OF PRETERM AND LOW BIRTH WEIGHT INFANTS

Ergasheva Nargiza Nasriddinovna
TSMU- Tashkent State Medical University
Neurology, children neurology and medical genetics
https://orcid.org/0000-0001-5079-3166
Bozorova O'g'iloy Sherali qizi
TSMU- Tashkent State Medical University
Neurology, children neurology and medical genetics
https://orcid.org/0009-0003-7215-6506
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Introduction: Preterm birth, defined as delivery before 37 completed weeks of gestation, and low birth weight (LBW), defined as birth weight below 2500 g, represent major public health concerns associated with significant neonatal morbidity and long-term neurodevelopmental disability. According to WHO data, approximately 15 million preterm births occur annually worldwide, with preterm complications being the leading cause of death among children under five years of age. The immature central nervous system of preterm infants is highly susceptible to hypoxic-ischemic injury, hemorrhagic lesions, and white matter damage. These conditions frequently manifest as cerebral palsy, cognitive impairment, epilepsy, and sensory disorders in later life. Despite advances in neonatal intensive care, early and accurate characterization of neurological status in preterm and LBW infants remains a clinical priority for guiding neuroprotective strategies and predicting outcomes.

Objective: To evaluate the clinical-neurological and paraclinical characteristics of preterm and low birth weight infants during the early neonatal period and to determine the leading predictors of neurological impairment.

Materials and Methods. A prospective cohort study was conducted involving 94 preterm neonates with gestational age between 28 and 36 weeks and birth weight ranging from 900 to 2490 g, admitted to the neonatal intensive care unit during the period 2019 to 2024. Infants with congenital malformations or chromosomal abnormalities were excluded. Clinical-neurological assessment was performed using the Hammersmith Neonatal Neurological Examination (HNNE) on days 3, 7, and 28 of life. Paraclinical investigations included cranial neurosonography performed on days 1, 3, and 7; electroencephalography (EEG); complete blood count; C-reactive protein; and blood glucose monitoring. Brain MRI was performed at term-equivalent age in selected cases. Data were analyzed using SPSS Statistics v.26 with significance set at $p < 0.05$.

Results. Neurological abnormalities were identified in 79 (84.0%) of the examined neonates. Muscular hypotonia was the most prevalent finding, detected in 61 (64.9%) infants. Suppression or absence of primitive reflexes was noted in 67 (71.3%) cases. Autonomic instability, including bradycardia and apnea episodes, was registered in 43 (45.7%) infants. Neonatal seizures occurred in 18 (19.1%) cases, predominantly of the subtle type. Neurosonographic examination revealed periventricular leukomalacia (PVL) in 24 (25.5%) infants, germinal matrix hemorrhage in 19 (20.2%) cases, and intraventricular hemorrhage (IVH) grade I–II in 28 (29.8%) and grade III–IV in 11 (11.7%) infants. EEG demonstrated background

suppression in 41 (43.6%) neonates and burst-suppression pattern in 12 (12.8%) cases. A statistically significant inverse correlation was found between gestational age and the severity of both clinical-neurological findings and neurosonographic pathology ($r = -0.71$, $p < 0.001$). Elevated CRP levels above 10 mg/L were associated with a 2.4-fold increased risk of grade III–IV IVH.

Conclusion. Preterm and low birth weight infants exhibit a high prevalence of clinical-neurological abnormalities, with muscular hypotonia, suppressed primitive reflexes, and neonatal seizures being the most frequent manifestations. Neurosonography performed serially in the first week of life is a reliable and accessible tool for early detection of cerebral hemorrhagic and ischemic lesions. EEG provides additional value in identifying subclinical seizure activity and assessing background brain electrical activity. The severity of neurological compromise is significantly correlated with the degree of prematurity. A comprehensive multimodal approach combining clinical neurological examination with neurosonography, EEG, and laboratory markers enables early stratification of at-risk neonates and should be incorporated into routine neonatal care protocols to optimize neuroprotective management and improve long-term neurodevelopmental outcomes.