FIELD: PEDIATRIC NEUROLOGY

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Research Aim

The aim of this research is to explore current trends and innovations in pediatric neurology, focusing on the early diagnosis, prevention, and management of neurological disorders in children. The study seeks to develop evidence-based approaches that enhance neurodevelopmental outcomes, improve quality of life, and promote integrated multidisciplinary care in pediatric neurological practice.

Research Materials and Methods

This research was carried out at the Department of Pediatric Neurology of the Bukhara Regional Multidisciplinary Children’s Medical Center over a period of three years (2022–2025). The study included 120 pediatric patients aged from 1 month to 15 years, diagnosed with various neurological disorders such as epilepsy, cerebral palsy, perinatal encephalopathy, and developmental delay. All participants were examined following ethical principles approved by the local medical ethics committee. Detailed anamnesis and neurological examinations were performed to assess motor, sensory, cognitive, and speech functions. Clinical observation was combined with modern instrumental diagnostic methods, including: Magnetic Resonance Imaging (MRI) for structural brain assessment, Electroencephalography (EEG) for detecting electrical brain activity, Neurosonography for infants, Laboratory analyses to identify metabolic and infectious etiologies. Cognitive and psychomotor development was evaluated using Denver Developmental Screening Test (DDST) and Bayley Scales of Infant Development (BSID). For patients with movement disorders, the Gross Motor Function Classification System (GMFCS) was used to determine the severity of impairment. Therapeutic interventions included pharmacological treatment, neurorehabilitation programs, physical therapy, and speech and occupational therapy. A multidisciplinary team consisting of pediatric neurologists, physiotherapists, psychologists, and speech therapists participated in the management process. Data were analyzed using SPSS 25.0 software. Descriptive statistics, correlation, and regression

analyses were applied to identify relationships between clinical manifestations, etiological factors, and neurodevelopmental outcomes

Results

The clinical and diagnostic evaluation of 120 pediatric patients revealed that the majority of neurological disorders were associated with perinatal brain injuries (42%), epileptic syndromes (28%), and cerebral palsy (19%). A smaller proportion of cases (11%) were linked to metabolic, genetic, and infectious factors. MRI and EEG findings demonstrated significant structural and functional abnormalities in 67% of patients. Among these, hypoxic-ischemic changes and cortical dysplasia were the most frequent findings. EEG abnormalities, such as generalized or focal epileptiform discharges, were observed in 55% of children with recurrent seizures. Neurodevelopmental assessment showed that motor delay occurred in 61% of patients, speech delay in 48%, and cognitive impairment in 36%. The severity of developmental delay was directly correlated with the duration and intensity of perinatal hypoxia ($r = 0.68$, $p < 0.01$). Children who received early multidisciplinary intervention (within the first 6 months after diagnosis) demonstrated a 30–40% improvement in motor and cognitive functions compared to those who started rehabilitation later. Pharmacological treatment combined with physiotherapy and psychological support significantly enhanced the patients’ overall functional outcomes.

Conclusion

The study highlights that early identification and timely intervention are crucial in improving neurodevelopmental outcomes in children with neurological disorders. Perinatal brain injury and epileptic syndromes remain the leading causes of pediatric neurological morbidity in the region. Comprehensive assessment using modern neurodiagnostic methods such as MRI and EEG enables accurate diagnosis and effective treatment planning. Multidisciplinary rehabilitation programs that combine pharmacological therapy, physiotherapy, and psychological support significantly enhance motor, cognitive, and speech development in affected children. The research emphasizes the importance of a coordinated approach between pediatric neurologists, rehabilitation specialists, and families to ensure optimal long-term outcomes. Therefore, strengthening early screening programs, expanding access to modern neurorehabilitation services, and increasing awareness among parents and healthcare providers are essential for reducing the burden of childhood neurological disorders and improving the overall quality of life for pediatric patients.

References

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