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Predicting Neurodevelopmental Outcomes: Unveiling the Potential of Biomarkers in Infants Born to Mothers with Hypertensive Disorders of Pregnancy

Introduction: Hypertensive disorders of pregnancy (HDP), affecting up to 10% of expectant mothers, places newborns at risk for neurodevelopmental impairment (NDI) due to the potential impact of these disorders on fetal brain development. We sought to identify fetal and newborn biomarkers for the early prediction and detection of neurological impairments in infants born to mothers with hypertension.

Methods: A systematic review was conducted using PubMed and EMBASE databases which were queried for scientific papers published after the year 1990. Methodology from Preferred Reporting Items for Systematic Reviews and Meta Analysis (PRISMA) was employed.

Results: 855 articles were screened of which four met inclusion criteria. The most frequently used biomarker was umbilical artery (UA) doppler flow velocimetry. The studies focused on a range of neurodevelopmental outcomes and utilized diverse standardized testing methodologies. Beuker et al. investigated the pulsatility index of the UA and middle cerebral artery ratio in children with fetal growth restriction, finding increase social and attention problems in these children. Delorme et al. linked absent or reversed end-diastolic flow on UA doppler with moderate to severe neuromotor and/or sensory disability. Kirsten et al. explored the absence of end-diastolic umbilical artery doppler flow velocities, noting low performance scores. Bharadwaj et al found that those with lower antioxidant levels had increased correlation with higher mental and motor development quotients.

Conclusion: The paucity of available literature highlights the need for evaluating potential biomarkers to enhance NDI assessment, offering additional prognostic information and aiding in the identification of infants at elevated risk of long-term neurological morbidity. This would facilitate timely interventions to mitigate the impact of NDIs on their developmental trajectories.