

Cerebral Palsy and Maternal Injury During Pregnancy

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Cerebral palsy (CP) remains the most common lifelong physical disability condition in childhood, affecting about 2 to 4 children per 1000 live births each year in high-income countries. The etiological causes for most CP cases remain unknown,¹ and only a few perinatal risk factors, such as birth asphyxia, preterm delivery, and infections, have been identified.² Ahmed and colleagues³ conducted a large medical linkage cohort study of CP that included more than 2 million mothers and children living in Ontario, Canada, and reported that maternal unintentional injury during pregnancy was associated with a higher risk for CP in the offspring (hazard ratio, 1.33; 95% CI, 1.18-1.50). The study showed that maternal injuries that were severe, such as those resulting in hospitalization or having to deliver within a week following the injuries, were more strongly associated with the offspring's CP risk. A large study sample size allowed several subgroup analyses, including the investigation of the frequency, types, and trimesters of occurrence of the injuries.

This study highlights the need for better characterization and monitoring of potential long-term health consequences of fetal exposure to maternal injuries. However, mothers affected by unintentional injuries during pregnancy should be reassured that the offspring's absolute risk of developing CP remains relatively low, especially for mild injuries. Even for the most severe group among mothers who delivered within a week after the injury, the estimated absolute risk of CP in the offspring would be about 10 per 1000 live births (applying adjusted hazard ratio of 3.4 to the baseline risk of CP, assuming 3 per 1000 live births).

The study also reveals that stronger associations were observed for exposures to transport-related crashes and mechanical forces (eg, struck by another person or object); some of these unintentional injuries might be preventable. For instance, a proper placement of a seat belt may decrease maternal and fetal morbidity and mortality from vehicle collisions.⁴ Other strategies to reduce exposure risk for vehicle collisions include driving in good weather, at an average speed, and on well-maintained roads, whenever possible.⁴ It is unclear from the study where the mechanical forces occurred. If workplace and sport-related injuries are involved, strategies that reduce these types of injuries should be applied. There was no

strong association observed between falls during pregnancy and offspring CP risk, possibly because most injuries from falls were mild. This study did not examine the types of injuries and their severity simultaneously. The recommendation for physical activity in pregnancy should not change,⁵ because maintaining an adequate level of physical activity has been associated with a lower incidence of falls up to 40%⁶ and improved ankle stiffness, muscle strength, body balance,⁷ and less excessive gestational weight gain.⁸ Postinjury factors were not evaluated. Pregnancy complications and the surgical procedure or treatments (eg, analgesics)⁹ following the injury may also influence offspring neurodevelopment¹⁰; these potential modifying factors are important to consider in clinical care.

It is known that some unintentional injuries are preventable and do not happen at random, but this register-based research lacks granular data on individual, household/environmental, and social behavioral factors for a more robust confounding control in the analysis. While a quantitative bias modeling has been used to suggest robustness of findings, concerns for residual confounding may not be fully resolved. Additional study design, such as a sibling-controlled analysis, could be an option to control for unmeasured confounding factors between sibling pairs.¹¹ Unintentional injuries may disproportionately affect vulnerable community. In the US, CP prevalence is higher for racial and ethnic minority, underserved, and low-income populations.¹² To what extent avoidable injuries during pregnancy affect vulnerable subgroups and contribute to the CP disparities are important for further research. Finally, CP encompasses a heterogeneous group of neuromotor phenotypes that are characterized by areas of the brains affected and/or the clinical manifestations. Most individuals with CP have some levels of comorbid neurological conditions, such as epilepsy, cognitive impairs, hearing or vision loss, and long-term behavioral/mental health difficulties.¹³ Future research that differentiating perinatal risk factors, including maternal injuries, for specific CP subtypes and the functioning are needed.

In summary, this large population-based cohort study that linked maternal unintentional injury during pregnancy and offspring CP should inspire more research into the preventing and mitigating factors for maternal injuries and offspring CP development.

ARTICLE INFORMATION

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