

EARLY INTERVENTION: RELATION BETWEEN THERAPY DOSAGE AND MOTOR FUNCTION IN PRETERM AND HIGH-RISK INFANTS WITH CEREBRAL PALSY: A MINI NARRATIVE REVIEW

BACKGROUND

Preterm infants often receive early intervention, particularly those at high risk of cerebral palsy. Early intervention aims to exploit the high neuroplasticity of early life in order to optimize motor function outcomes^{1,3}. However, it remains uncertain which therapy dosage including frequency, intensity, and duration per session is most appropriate⁵.

OBJECTIVES

The aim of this study is to review current evidence on the relationship between therapy dosage and motor outcomes in preterm and high-risk infants.

METHOD

A narrative review of:

- Systematic reviews
- Randomized controlled trials
- International clinical practice guidelines

focused on early intervention, therapy dosage, and motor function in preterm and high-risk infants.

RESULTS

The systematic review by Khurana et al. suggests that parent-delivered motor interventions initiated early and continued at home enhance motor and cognitive development in preterm infants, with moderate to large effect sizes. Outcomes were superior when interventions were delivered daily compared to lower-frequency practice, for both motor and cognitive development³.

The Noppi study by Øberg et al. found that infants who received a greater number of sessions achieved significantly higher gross motor and total motor function scores. These findings indicate that therapy dosage has an impact on motor function and demonstrate an important relationship between exercise dose and motor outcomes. The study also suggests that parent-delivered exercises positively influence developmental outcomes, a finding supported by existing research².

Findings from Hadders-Algra et al. indicate that active and goal-directed interventions can improve motor development, and that therapy dosage appears to influence intervention

effectiveness. Although variations in study design and reporting exist, these results highlight the potential importance of therapy dosage, while the optimal frequency, intensity, and duration remain to be clarified in future research¹.

International clinical practice guidelines recommend repeated daily, task-specific, and family-centered interventions. Parent coaching is strongly advocated to increase the effective daily dose of motor practice⁴. These recommendations align with neuroplasticity frameworks emphasizing that early intervention timing must be combined with sufficient dosage to optimize neural reorganization and functional motor learning⁵.

CONCLUSION

These findings reinforce that optimal exploitation of neuroplasticity in preterm infants requires not only early intervention but also sufficient intensity and repetition of motor experiences. High-intensity, task-specific, and family-centered interventions, supported by parent coaching, appear essential for optimizing neuroplasticity and functional motor learning. Further research is needed to determine the optimal balance of therapy dosage to achieve the most effective outcomes.

REFERENCES

1. Hadders-Algra M, Boxum AG, Hielkema T, Hamer EG. Effect of early intervention in infants at very high risk of cerebral palsy: a systematic review. *Dev Med Child Neurol*. 2017;59(3):246–258.
2. Gunn Kristin Øberg, Bjørn Helge Handegård, Suzann K Campbell, Tordis Ustad, Toril Fjærtøft, Per Ivar Kaaresen, Gay L Girolami. Two-year motor outcomes associated with the dose of NICU-based physical therapy: the NOPPI randomized controlled trial. *Early Hum Dev*. 2022 Nov;174:105680.
3. Sonia Khurana, Audrey E Kane, Shaaron E Brown, et al. Effect of neonatal therapy on the motor, cognitive, and behavioral development of infants born preterm: a systematic review. *Dev Med Child Neurol* 2020 Jun;62(6):684-692
4. Catherine Morgan , Linda Fetters et al . Early intervention for children aged 0 to 2 years with or at high risk of cerebral palsy. International Clinical Practice Guideline Based on Systematic Reviews *JAMA Pediatr*.2021 Aug 1;175(8):846-858
5. Mary E Gannotti. Coupling timing of interventions with dose to optimize plasticity and participation.2017 Jul;29(Suppl 3 IV STEP 2016 CONFERENCE PROCEEDINGS):S37–S47