The association between spastic Cerebral Palsy, intellectual impairment, and gestational age: results from the Northern Ireland Cerebral Palsy Register

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Introduction

Evidence suggests there is a complex relationship between Cerebral Palsy subtype, gestational age (GA), and severity of intellectual impairment. To investigate these relationships, we conducted analyses on over 1,100 children with Spastic Bilateral and Unilateral Cerebral Palsy subtypes included in the NICPR, focusing on the intellectual impairment outcome.

Aims

• To assess the association between intellectual impairment severity and gestational age while controlling for birth weight
• To test if this association changes between the Spastic Bilateral and Unilateral Cerebral Palsy subtypes

Methods

Population: Children registered in NICPR born between 1981-2008 with Spastic Bilateral and Unilateral Cerebral Palsy subtypes. Those with acquired Cerebral Palsy (Cerebral Palsy due to lesions or anomalies occurring after 28 days of life) and those who died before the age of 2 were excluded.

Measures: Gestational Age was categorised into very extremely preterm (<32 weeks), moderately preterm (32 to 36 weeks) and term (37+ weeks). Birth weight was standardised (z-scores) using Gardosi foetal growth standard curves (Gardosi et al., 1995). Intellectual impairment was categorised into severe (IQ <50) and not severe (IQ >=50). Surveillance of Cerebral Palsy in Europe categories for Spastic Bilateral and Unilateral Cerebral Palsy subtypes were used (SCPE, 2000). To control for socio-economic deprivation, we used the Northern Ireland Multiple Deprivation Measure (NISRA, 2005) and compared children living in areas in the most deprived quintile to children living in less deprived areas.

Statistical analyses

We used descriptive statistics and logistic regressions to investigate the effects of Gestational Age and Cerebral Palsy subtype on intellectual impairment, while controlling for standardised birth weight, child’s sex, exposure to socio-economic deprivation, and the effects of year of birth.

Results

Descriptive statistics: Information was available for 1,197 children born between 1981 and 2008 who were diagnosed with Bilateral (n = 693; 54% of all eligible) or Unilateral Spastic (n = 504; 39% of all eligible) Cerebral Palsy.

Regression analyses: Premature birth was associated with reduced odds of severe intellectual impairment, but this effect was conditional on CP subtype.

Results confirmed a strong association between Spastic Bilateral CP subtype and severe intellectual impairment. The probability of severe intellectual impairment among these children increased across gestational age categories (see Figure).

Discussion

The study provides further support to studies indicating that prematurity does not adversely affect the probability of intellectual impairment in children with Spastic Bilateral CP subtype (Hemmings et al., 2008). These results may be explained by the fact that Spastic CP can be a heterogeneous group, with different aetiologies across gestational ages. However, these could also indicate that the brain may be able to compensate and reorganise following injuries during early development.

These findings need to be replicated and extended using larger datasets from international collaborations, and including more detailed information about birth.

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