



ORIGINAL ARTICLE

Evaluation of coordination and balance in preterm children[☆]



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Abstract

Introduction: Recent studies show that many preterm children without apparent neurological sequelae present some difficulties in different areas, such as coordination or balance during their school years. The Movement Assessment Battery for Children-2 (MABC-2) has demonstrated to be a useful tool to validate the coordination, while the stabilometric platform was the reference standard test for validating the balance.

Patients and method: Case-control study carried out on preterm children from 7 to 10 years old and healthy term infant controls of the same ages. The same age band of MABC-2 was applied and the static balance by the stabilometric platform was analysed.

Results: A total of 89 subjects were included, 30 preterm children ≤ 1500 g birthweight, 29 preterm children >1500 g birthweight, and 30 controls. Preterm children obtained the lowest scores on an overall basis in hand dexterity and balance tests in MABC-2, regardless of their birthweight. Lower gestational age was associated with poorer outcomes in hand dexterity and total scores in MABC-2. Balance results were similar using the stabilometric platform, regardless of prematurity.

Conclusions: A little more than 10% preterm and term children could have coordination disorders or be at risk of developing them using the MABC-2. Despite the visual-motor coordination

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PALABRAS CLAVE

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being similar, preterm children could face greater difficulties in hand dexterity while, in the absence of neurological comorbidity, preterm and term children balance could be comparable.
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Valoración de la coordinación y el equilibrio en niños prematuros**Resumen**

Introducción: Estudios recientes demuestran que muchos niños prematuros sin secuelas neurológicas aparentes presentan dificultades en diferentes áreas, como la coordinación o el equilibrio, durante la etapa escolar. El *Movement Assessment Battery for Children-2* (MABC-2) constituye una herramienta validada para la valoración de la coordinación, mientras que la estabilometría sería la prueba *gold standard* para el equilibrio.

Pacientes y método: Estudio de casos y controles realizado en niños prematuros de 7-10 años y controles sanos nacidos a término de la misma edad. En ambos grupos se aplicó la franja de edad número 2 del MABC-2 y se analizó el equilibrio estático mediante estabilometría.

Resultados: Se incluyeron 89 sujetos: 30 prematuros de peso al nacimiento ≤ 1.500 g, 29 prematuros de peso > 1.500 g y 30 controles. Los prematuros obtuvieron peores puntuaciones totales de forma global en destreza manual y equilibrio en el MABC-2, independientemente del peso al nacimiento. La menor edad gestacional supuso la obtención de peores puntuaciones en destreza manual y *scores* totales en el MABC-2. El equilibrio fue similar mediante la estabilometría, independientemente de la prematuridad.

Conclusiones: Algo más de un 10% de prematuros y controles podría tener trastornos de la coordinación o estar en riesgo de desarrollarlos empleando el MABC-2. A pesar de que la coordinación visomotriz fue similar, los prematuros podrían tener mayores dificultades en destreza manual, mientras que en ausencia de comorbilidad neurológica, el equilibrio postural parece ser equiparable al de los controles sanos de su misma edad.

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Introduction

Advances in the fields of obstetrics and neonatology have improved the survival of children born preterm. However, this improvement is associated with considerable morbidity.¹

Recent studies have shown that compared to their peers, many children born preterm considered to be free of neurological sequelae experience difficulties in some developmental areas that may go unnoticed until school age, such as coordination, balance, or attention.^{2,3}

The acquisition of motor skills and control is a long process that starts with newborn reflexes and continues throughout the lifespan and is influenced by environmental factors and the performance of motor activities during development.^{4,5} Visual-motor integration is defined as the immediate and precise response that takes place following the appearance of an object in the visual field.⁶ Developing adequate coordination requires having an adequate body scheme combined with adequate afferent sensory information and control over the existing body scheme, which allow an effective motor response.

Postural control is defined as the ability to sustain balance by maintaining the body centre of gravity on the base of support.⁷ From a biomechanical perspective, we use the

term “balance” to refer to the dynamics of body posture to prevent falls, which is related to the forces that act on the body.⁸ Maintaining balance requires the integration of the information provided by the proprioceptive, vestibular and visual systems.

There are different tools to assess motor competence and coordination, such as the Bayley-III scale or the Touwen Infant Neurological Examination for infants and toddlers, and the Bruininks-Oseretsky Test of Motor Proficiency, the Visual Motor Integration Test or the Movement Assessment Battery for Children-2 (MABC-2) for school-aged children, among others.

Recent studies have shown that the Bayley scale is one of the best tools for the assessment of infants and young children, while the MABC-2 and the Bruininks-Oseretsky Test of Motor Proficiency would be the preferred assessment tools in school-aged children.⁹ Stabilometry, also known as posturography, is currently the gold standard for the specific assessment of balance.¹⁰

We designed this study with the aim of analysing coordination and balance in school-aged children born preterm with no significant neurological sequelae, comparing them with healthy children born to term of the same age to assess the potential association of the degree of prematurity and these two motor skills.

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