



ORIGINAL ARTICLE

Evaluation of isometric force in lower limbs and body composition in preterm infants[☆]



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Received 9 October 2014; accepted 16 December 2014

KEYWORDS

Prematurity;
Strength gauge;
DEXA – dual-energy
X-ray absorptiometry;
Strength;
Body composition

Abstract

Introduction: Strength is a physical quality with a clear influence on quality of life. It is determined by the structure of the musculoskeletal system, and depends on the muscular structure. It has been described that prematurity conditions both qualities. The aims of this study are to determine whether prematurity is associated with strength or body composition and to evaluate the relationship between prematurity, strength and muscle mass.

Material and methods: Case-control study. Participants were premature 7-to-11-year-old children and full-term birth controls. Strength was measured by a strength gauge and body composition from DEXA (dual-energy x-ray absorptiometry) scans. A total of 89 subjects were included and divided into three groups: 30 prematures with birth weight ≤ 1500 g, 29 prematures with birth weight 1500–2000 g, and 30 controls.

Results: Weight and BMI z-score was lower in the premature group. No differences were found in muscular mass or strength between groups. A ratio was established between strength and weight or muscular mass. It was observed that it was possible for them to move four times their weight, without finding any differences between groups or a relationship with birth weight.

Conclusions: Between 7 and 11 years of age, children who were premature have lower weight and BMI than the rest of the children. However, there were no differences in body composition or strength between preterm children and controls.

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[☆] Please cite this article as: Mata Zubillaga D, Rodríguez Fernández C, Rodríguez Fernández LM, de Paz Fernández JA, Arboleda Franco S, Alonso Patiño F. Valoración de fuerza isométrica en extremidades inferiores y composición corporal en prematuros. An Pediatr (Barc). 2015;83:229–235.

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PALABRAS CLAVE

Prematuridad;
Galga
extensiométrica;
Absorciometría de
rayos X de energía
dua;
Fuerza;
Composición corporal

Valoración de fuerza isométrica en extremidades inferiores y composición corporal en prematuros**Resumen**

Introducción: La fuerza es una cualidad con clara influencia sobre la calidad de vida. Está condicionada por la estructura del aparato locomotor y es directamente dependiente de la estructura muscular. Se ha descrito que ambas cualidades están condicionadas por la prematuridad. Son objetivos del estudio conocer si la prematuridad está relacionada con la fuerza o la composición corporal durante la infancia y valorar la relación entre prematuridad, fuerza y masa muscular. **Material y métodos:** Estudio de casos y controles realizado en niños de entre 7 y 11 años con desarrollo normal y controles a término de la misma edad. Se incluyó a 89 sujetos: 30 prematuros con peso al nacimiento ≤ 1.500 g, 29 prematuros con peso al nacimiento > 1.500 g y 30 controles. Se analizaron antropometría, composición corporal mediante absorciometría de rayos X de energía dual y fuerza isométrica mediante banco inclinado y galga.

Resultados: El peso y el IMC fueron menores en los niños que pesaron ≤ 1.500 g. No se observaron diferencias en composición corporal ni fuerza. Se estableció una razón entre fuerza y masa muscular, resultando esta de un peso desplazado 4 veces superior al peso corporal, no encontrándose diferencias entre grupos ni relación con el peso al nacimiento.

Conclusiones: Entre los 7 y los 11 años de edad, los niños que fueron grandes prematuros tienen un peso y un IMC menores al resto de los niños. No se encontraron diferencias entre prematuros y controles en cuanto a composición corporal y fuerza muscular.

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Introduction

Neonatal care has become specialised and improved considerably, progressively incorporating new technologies and scientific advances.¹ This progress has been most evident in the premature population. The number of preterm and very preterm patients has increased considerably in recent decades.²

The body composition of individuals changes over time during childhood and adolescence.^{3,4} In addition to a quantitative evolution that is parallel to growth, continuous changes in the proportions and characteristics of its components take place.⁵ Furthermore, in the past two decades, skeletal muscle has been identified as a fundamental component of the immune system and as an endocrine organ.⁶

Strength is defined as the basic physical ability that allows us to generate muscle tension in single maximal effort to overcome a resistance or load.⁷ It is conditioned by the structure of the musculoskeletal system and determined in part by muscular structure.

Some authors have stated that the level of physical activity of individuals born preterm is lower than that of individuals born at term.^{8,9} Similarly, it has been reported that overall, individuals born preterm have more muscle tone and motor coordination problems,¹⁰⁻¹² and that their muscle strength is lesser in many instances.¹³

Confirmation that these deficits exist in premature children and the degree to which they impact them would allow for the early implementation of strategies aimed at minimising these deficits, optimising the available resources and improving the prognosis of this population.

The aim of this study was to determine whether prematurity is associated with body composition and strength during childhood, and to assess the association between prematurity, strength, and lean mass or muscle mass.

Materials and methods

We conducted an observational, cross-sectional, descriptive and prospective case-control study.

Sample

We included children born between January 1, 2001 and December 31, 2004. The data were collected throughout 2012. Thus, study participants were 7–11 years of age.

A total of 89 participants, 37 male and 52 female, were included in the study.

Cases

Children born preterm who were admitted to the neonatal unit and had a seemingly normal psychomotor and cognitive development were studied. We defined prematurity as birth occurring before the start of the 37th week of gestation. We subsequently divided the cases into two groups based on birth weight, PREM_1 (birth weight ≤ 1500 g) and PREM_2 (birth weight > 1500 g). The sex distribution was random. Corrected age was calculated based on 40 weeks of gestation.

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