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Variables associated with extra uterine growth restriction in very low birth weight infants ☆

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Abstract

Objectives: to determine the rate of extrauterine growth restriction in very low birth weight infants and to evaluate the influence of perinatal variables, clinical practices, and neonatal morbidities on this outcome.

Methods: a longitudinal study was performed in four neonatal units in the city of Rio de Janeiro. 570 very low birth weight infants were analyzed. The study included perinatal variables, variables related to clinical practices, and incident morbidities in these preterm infants. Extrauterine growth restriction was defined using z-scores for weight or head circumference $\leq$ -2 for corrected age. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) and R software.

Results: this study comprised 570 infants, of which 49% were males, and 33% were small for gestational age (SGA). The mean weight and head circumference at birth were $1,113 \pm 267$ g and 27 ± 2 cm, respectively. The mean z-scores of birth weight and weight at discharge were -0.96 $\pm$ 0.78 and -1.54 $\pm$ 0.75, respectively; for head circumference, the mean z-scores at birth and at discharge were -0.63 $\pm$ 1.18 and -0.45 $\pm$ 0.94, respectively. The rate of extrauterine growth restriction considering the weight was 26% (149/570) and considering the head circumference, 5% (29/570). SGA was the variable with the greatest impact on both growth restriction for weight (PR = 4.33) and for head circumference (PR = 2.11) in adjusted analyses.

Conclusion: extrauterine growth restriction was high in the population, especially for SGA newborns and those with neonatal morbidities.

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Fatores associados à restrição de crescimento extrauterino em recém-nascidos pré-termos de muito baixo peso ao nascer

Resumo

Objetivos: determinar a frequência da restrição de crescimento extrauterino em recém-nascidos pré-termos de muito baixo peso e avaliar o impacto de variáveis perinatais, práticas clínicas e morbidades neonatais nesta morbidade.

Materiais e métodos: foi realizado um estudo longitudinal em 4 unidades neonatais do Rio de Janeiro. Foram analisados 570 recém-nascidos pré-termos de muito baixo peso. Foram incluídas no estudo variáveis perinatais, variáveis relacionadas às práticas clínicas e morbidades incidentes nestes recém-nascidos. A restrição de crescimento extrauterino foi definida pelos escores z de peso ou perímetro cefálico $\leq$ -2 para idade corrigida. Na análise estatística foram utilizados o software SPSS e o software R.

Resultados: foram analisados 570 recém-nascidos dos quais 49% eram do sexo masculino e 33% nasceram pequenos para idade gestacional. A média do peso e perímetro cefálico ao nascimento foi respectivamente 1113 $\pm$ 267 g e 27 $\pm$ 2 cm. As médias de escore z do peso ao nascimento e na alta foram respectivamente, -0,96 $\pm$ 0,78 e -1,54 $\pm$ 0,75 e as do perímetro cefálico foram -0,63 $\pm$ 1,18 e -0,45 $\pm$ 0,94. A frequência de restrição de crescimento extrauterino considerando o peso foi 26% do perímetro cefálico foi de 5%. Nascer pequeno para idade gestacional foi a variável de maior impacto na restrição de crescimento tanto para o peso (RP 4,33) quanto para o perímetro cefálico (RP 2,11) nas analises ajustadas.

Conclusão: a restrição de crescimento extrauterino foi alta na população, especialmente para os recém-nascidos PIG e com morbidades neonatais.

Introduction

The growing advances in neonatology and in intensive care have been increasing the survival of progressively more premature infants, born at increasingly younger gestational ages and with lower birth weights.[1] Consequently, this fact has increased the concern of professionals working in long-term follow-up of these children regarding their quality of life, considering the different aspects involved, whether somatic growth or psychomotor development.[2]

Currently, in spite of improvements in the nutritional support of preterm infants with very low birth weight through aggressive and early parenteral and enteral nutrition, growth restriction in the postnatal period is often observed, with growth rates that are significantly lower than the intrauterine rates in fetuses of the same gestational age, a situation termed extrauterine growth restriction (EUGR).[3]

Thus, premature birth places infants at high nutritional risk, as it interrupts the growth phase at its fastest stage. Furthermore, many of these infants develop chronic diseases precisely at the initial period of their lives, when rapid growth is expected, with consequent high caloric requirements.[3] Postnatal growth failure in very low birth weight infants is an almost universal phenomenon.[4]

Clark et al. showed significant EUGR for weight (28%), length (34%), and head circumference (16%) in preterm infants during hospitalization.[5] Data from the neonatal research network of the National Institute of Child and Human Development (NICHD) demonstrated that 16% of preterm infants with very low birth weight were small for gestational age (SGA) at birth; however, when they reached 36 weeks of corrected age, 89% of this same population of preterm infants had postnatal growth failure.[6] The impact of this growth restriction and nutritional problems at such early age can influence the future quality of life, as it can affect brain growth and, consequently, development, and contribute to the onset of chronic adult diseases such as hypertension, diabetes, obesity, and hypercholesterolemia.[7–10]

The aim of this study was to determine the frequency of EUGR in very low birth weight infants and to evaluate the impact of perinatal variables, clinical practices, and neonatal morbidities on this outcome.

Methods

This was a longitudinal study, which analyzed a cohort of 570 newborns (NBs) with very low birth weight admitted in four neonatal units of the Perinatal Network (Rio de Janeiro) from January of 2007 to December of 2011. The four neonatal units have similar infrastructure, and clinical and nutritional practices are standardized in clinical protocols with equal levels of adherence. These guidelines recommend early parenteral nutrition and use of the mother's own milk, fortified, or formula for preterm infants in the absence of breast milk for this population.

All infants admitted during the study period were included in the study, using a convenience sample. Infants with congenital malformations, who died, or who were transfered during hospitalization were excluded.

The information was obtained from the database of the Vermont Oxford Network of the Perinatal Network. This database contains perinatal variables, demographic