

Note on the Growth Rates of Preterm and Full-Term Infants

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DESCRIPTION

Longitudinal follow-up of infant growth rates involves conducting regular physical measurements to screen high-risk infants who deviate from the normal trajectory of growth and development. A comprehensive understanding of optimal growth and development is of critical importance for improving survival and long-term outcomes in preterm and full-term infants. However, the growth pattern of preterm infants is significantly different from that of full-term infants at different ages of life. Some previous studies mainly adopted a cross-sectional design which was not suitable for exploring the growth rates of preterm and full-term infants. Furthermore, longitudinal follow-up has seldom been used to determine the growth rates and influencing factors of preterm and full-term infants. Therefore, we constructed longitudinal data from a specific birth cohort of singleton preterm and full-term infants during the first year of life. Based on the longitudinal data, various biological and environmental factors were paid more importance to the growth rates of preterm infants.

Relevant research has shown that there was a vital "opportunity window" for the growth rates of preterm infants within 2 to 3 months of corrected age, which would play an extremely important role in future growth and development. This study showed that the growth rates of the length and weight of preterm infants were significantly lower than those of full-term infants from birth to 3 months of corrected age ($P < 0.05$). With the increase of age, there were no significant differences in the growth rates of the length and weight between preterm and full-term infants from 3 to 12 months of corrected age ($P > 0.05$). It was suggested that the length and weight of preterm infants showed catch-up growth after 3 months of corrected age, and gradually reached the level of full-term infants. Fetal Intrauterine Growth Retardation (IUGR) was the main reason for the growth rates of preterm infants. Meanwhile, the advent of preterm formula or breast milk fortifiers might be helpful in a more customized approach to the growth rates of preterm infants. Consequently, preterm infants could reasonably supplement

additional calories to present an obvious trend of catch-up growth. Specifically, the growth rates of preterm infants have been attributed to the regulatory mechanism of Growth Hormone (GH), Insulin-Like Growth Factor-1 (IGF-1), and Insulin-like Growth Factor Binding Protein-3 (IGFBP-3). This study showed that the serum titers of IGF-1 and IGFBP-3 of preterm infants were significantly lower than those of full-term infants ($P < 0.05$). As for the regulatory mechanism, GH was an important regulator for the growth rates of preterm infants in a pulsed pattern, and IGF-1 formed a complex with IGFBP-3 which was closely related to the growth rates of preterm infants. However, the serum levels of IGF-1 and IGFBP-3 might result from fetal IUGR of preterm infants. Therefore, the serum titers of IGF-1 and IGFBP-3 were closely related to the growth rates of preterm infants.

Based on this study, the interaction of biological and environmental factors were attached more importance to the growth rates of preterm infants. This study also demonstrated that there were two favorable variables, such as gestational week and birth length, and two unfavorable variables, such as gender and delivery times, which were associated with the growth rate of the length of preterm infants by the contribution of risk factors ($P < 0.05$). Meanwhile, there were two favorable variables, such as gestational week and birth weight, and two unfavorable variables, such as delivery times and pregnancy induced hypertension syndrome, which were associated with the growth rate of the weight of preterm infants by the contribution of risk factors ($P < 0.05$). The biological and environmental factors resulted in insufficient secretion of IGF-1 and IGFBP-3 in preterm infants through DNA methylation, which was an important reason why the growth rate of preterm infants was significantly lower than that of full-term infants. In conclusion, the interaction of various biological and environmental factors regulated the pathogenesis of IGF-1 and IGFBP-3 through DNA methylation, and jointly affected the growth rates of preterm infants. Therefore, multidisciplinary interventions should be developed to promote the growth rates of preterm infants within the first 3 months of corrected age.

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Received: 01-Feb-2023, Manuscript No. CPOA-22-20641; **Editor assigned:** 04-Feb-2023, PreQC No. CPOA-22-20641 (PQ); **Reviewed:** 17-Feb-2023, QC No. CPOA-22-20641; **Revised:** 23-Feb-2023, Manuscript No. CPOA-22-20641 (R); **Published:** 06-Mar-2023, DOI: 10.35248/2572-0775.23.8:233.

Citation: Li Y, Xiong Z (2023) Note on the Growth Rates of Preterm and Full-Term Infants. Clin Pediatr. 8:233.

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AUTHORS' CONTRIBUTIONS

Yan Li collected the clinical and epidemiological data for more than one year. Zhonggui Xiong designed the project, and composed this study for several times.

FUNDING

This study was supported by the Maternal-Infant Nutrition and Health Research Project, the National Center for Women and

Children's Health of the Chinese Center for Disease Control and Prevention (Project No.: 2020FYH009). The funder had no role in the study design, data collection and analysis, decision to publish, or manuscript preparation.

ACKNOWLEDGEMENT

We thanked all parents or guardians for their participation in this study, and all researchers for their work in the clinical observation and epidemiological investigation.