ARTICLE

Sensitive Timing for Risk of Overweight Among Infants of Low-Income Hispanic Immigrants

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ABSTRACT

Introduction: This study examined the association between early weight gain (0–6 months) and risk for overweight, as defined by the Institute of Medicine, at 1 year among infants of low-income Hispanic immigrant mothers.

Method: Weight-for-age data were extracted from electronic medical records of 335 infants with gestations of 37 weeks or longer and birthweights appropriate for gestational age and without medical problems likely to interfere with growth or feeding. Logistic regression models were constructed to examine the impact of early weight changes on weight status at 1 year.

Results: By 12 months, 36.7% of infants had crossed weight-for-age of 84.1% or greater on World Health Organization growth charts. In adjusted models, infants had 20.8 (95% confidence interval = [19.8, 44.0]) times the odds of reaching this benchmark at 1 year for each *z* score increase at 0 to 6 months.

Discussion: The study highlights a time-sensitive opportunity for interventions to reduce risk for overweight for this vulnerable population. J Pediatr Health Care. (2017) ■, ■-■.

KEY WORDS

Infant weight, Hispanic, immigrant

A recent population-based, national U.S. survey of childhood obesity found that among 2- to 5-year-olds, Hispanic children have higher rates of obesity and extreme obesity than any other racial/ethnic group (Ogden et al., 2016). This finding has important health policy implications, because current estimates indicate that 1 in 4 of our nation's young children is Hispanic, with more than half of these children having at least one parent who is an immigrant to the United States (Murphey, Guzman, & Torres, 2014). The survey findings also have substantial clinical implications based on the well-established evidence that childhood obesity leads to elevated blood pressure, diabetes, musculoskeletal disorders, and other cumulative effects that may extend from childhood into adolescence and adulthood. A report of the World Health Organization (2017) pointed out that the risk for these morbidities depends partly on the age of onset and the duration of the overweight or obesity. The national survey findings, however, did not address weight status differences for children younger than 2 years of age.

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This is an important omission, because recent evidence suggests that the underpinnings of childhood obesity may begin early in the life cycle. One retrospective study (Harrington et al., 2010) of overweight and obese older children found that half had been overweight by 2 years of age and 90% had become overweight by age 5 years. Further examination of the children's weight trajectories led these researchers to conclude that the critical period for preventing childhood obesity may have been during the first 2 years of life and that for many the tipping point may have occurred between birth and 3 months of age. This latter finding is consistent with the research by Taveras et al. (2011), who found that obesity prevalence at ages 5 and 10 years of age was highest among children who crossed two or more major growth percentiles in the first 6 months of life. To date, studies of the relationship between weight gain in early infancy and later obesity have been limited by an underrepresentation of Hispanic children (Dennison, Edmunds, Stratton, & Pruzek, 2006; Goodell, Wakefield, & Ferris, 2009; Taveras et al., 2009). Therefore, the purpose of this study was to examine the association between early weight gain (0–6 months) and risk for overweight, as defined by the Institute of Medicine (IOM; 2011), at 1 year of age among infants of low-income Hispanic immigrant mothers.

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METHODS

Sample and Setting

Data were extracted from the medical records of 335 infants at a large pediatric, primary care setting in Virginia that serves low-income families. After approval of health care site and university institutional review boards, demographic and growth data were extracted for maternal–infant dyads who met study inclusion criteria. To address the study purpose, the sample was restricted to infants of mothers who were Hispanic immigrants to the United States and who had birthweights within ±1 standard deviations of the mean, based on World Health Organization (WHO) growth standards (Grummer-Strawn, Reinold, Krebs, & Centers for Disease Control and Prevention, 2010). Thus, their infants weighed between 2,800 and 3,850 g at birth (2,800–3,695 g for females; 2,900–3,850 g for males), 37 weeks' gestation or longer, without medical problems that would interfere with feeding or growth and for whom weight-for-age (WFA) data were available for birth, 6 months, and 12 months of age.

Measures

Infant WFA data from measurements taken at birth and at 2, 4, 6, and 12 months of age during regularly scheduled well visits were extracted from electronic medical records. Because preliminary analyses indicated that hospital-based measurements of birth length were not consistent with later measurements at first well child visits at the study site, we used WHO sex- and age-specific WFA z scores and percentiles to describe growth changes during these timeframes, as has been done in prior research (Li, Fein, & Grummer-Strawn, 2008; Stettler, Kumanyika, Katz, Zamel, & Stallings, 2003). We excluded z scores greater or less than 5 as biologically implausible, as also has been the procedure in prior research (Li et al., 2008). z scores correspond to major percentile scores on the WHO growth charts for infants 0 to 2 years of age. The z score is the standard deviation above or below the mean, such that a z score of 0 is the same as the 50th percentile, $z + 1$ is a percentile of 84.1, and $z + 2$ a percentile of 97.7 on the WHO WFA growth charts for children 0 to 2 years of age.

Main Outcome

Based on IOM (2011) designations of weight status categories, 12-month-old infants with a WFA percentile of 84.1 or greater were identified as being at risk for overweight. In addition to the description of z score differences, growth percentiles were used to describe findings because this approach mirrors clinical practice, where growth percentiles are used at regularly scheduled well-child visits.

Statistical Analysis

Descriptive statistics were used to assess the distribution of maternal–infant characteristics and WFA changes in early infancy (0–6 months). Logistic regression models were constructed to examine the impact of weight change in early infancy on weight status at 12 months of age (WFA percentile $<$ vs. $\geq$ 84.1 at 12 months), adjusting for factors that have been found to be significant in prior child obesity research. These factors included maternal age, education, prepregnancy body mass index (weight/height squared, kg/m^2), parity, and infant sex and birth weight (Gaffney, Kitsantas, & Cheema, 2012; Taveras, Gillman, Kleinman, Rich-Edwards, & Rifas-Shiman, 2010). For our sample, we controlled for mother's length of time in the United States as a marker for acculturation. Further, we converted the odds ratios obtained from the logistic regression models into probabilities using Stata's margins and marginsplot command (StataCorp, 2015) to gain a better understanding of the results. The probability estimates were constructed for the sample median birth weight of 3,340 g ± 450 g (2,890 g; 3,340 g; and 3,790 g) to illustrate its statistically significant effect on crossing the benchmark for risk for