



## Differences in modifiable feeding factors by overweight status in Latino infants



Diana Cartagena, PhD, CPNP<sup>a,\*</sup>, Jacqueline M. McGrath, PhD, FAAN<sup>b</sup>, Saba W. Masho, MD, DrPH<sup>c</sup>

<sup>a</sup> School of Nursing, Old Dominion University, Norfolk, VA 23529

<sup>b</sup> Research and Scholarship, School of Nursing, University of Connecticut, Storrs, CT 06269

<sup>c</sup> Department of Family Medicine and Population Health, Virginia Commonwealth University, Richmond, VA 23219

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### ABSTRACT

**Purpose:** Obesity prevalence remains disproportionately high for young American children from low-socioeconomic and ethnic minorities. Modifiable feeding factors may lead to infant overfeeding and an increased risk for obesity. This study explored differences in modifiable feeding factors by overweight status (>85% weight-for-length) in the first year of life of Latino infants.

**Methods:** Data were obtained from a cross-sectional pilot study of 62 low-income immigrant Latina mothers and their infants (ages 4–12 months). Measures included maternal feeding practices, feeding pattern, infant's 24-hour dietary recall, and maternal perception of infant weight. Chi-square and t-tests were used for comparisons between healthy weight and overweight infants.

**Results:** Birth weight z-scores did not significantly differ by weight status. Overweight status was not associated with maternal feeding practices, feeding pattern or infant dietary intake. A trend toward significance was seen in the maternal perception of infant weight.

**Conclusion:** Overweight infants were similar to healthy weight infants in their birth weight z-scores and supports the premise that modifiable feeding factors are in play and thus targeted early feeding interventions may prove effective in decreasing obesity risk in Latinos.

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## 1. Introduction

Obesity prevalence remains disproportionately high for young American children from low-socioeconomic and ethnic minorities particularly, Hispanics. An estimated 37% of infants enrolled in the women, infant, and children (WIC) supplemental feeding program are Hispanic, and approximately 16% of these infants are overweight or obese (U.S. Department of Agriculture, 2012). According to data from the 2011–2012 National Health and Nutrition Examination Surveys (NHANES), 9.4% Hispanic infants (<2 years of age) had high weights-for-length (>95th percentile) and 8.8% were at the > 97th percentile (Ogden, Carroll, Kit, & Flegal, 2014). Overweight at age two and later in life is associated with excessive weight gain as early as 3 months of age (Harrington et al., 2010). Evidence is lacking to clearly explain

modifiable factors in the first year or two of life that potentially contribute to this health disparity in Latinos.

Maternal feeding practices are recognized as modifiable feeding factors that may contribute to excessive infant weight gain (Dattilo et al., 2012). Breastfeeding in the first year of life appears to be protective against risks for obesity development in childhood and later life (Dattilo et al., 2012; Owen, Martin, Whincup, Smith, & Cook, 2005). National initiatives including Healthy People 2020 seek to promote improved rates of ever breastfed infants as well as those exclusively receiving breast milk for at least 6 months (U. S. Department of Health & Human Services, 2010). Hispanic mothers display positive attitudes toward breastfeeding initiation but commonly supplement breast milk with formula feeding beginning early in infancy (Gibson-Davis & Brooks-Gunn, 2006; Harley, Stamm, & Eskenazi, 2007). Favorable beliefs about combining breast milk and formula feeding may contribute to very low rates of exclusive breastfeeding (Holmes, Auinger, & Howard, 2011; Bunik et al., 2006; Vaaler, Stagg, Parks, Erickson, & Castrucci, 2010). Many Latina mothers recognize the importance and benefits of breastfeeding, but often provide complimentary formula feeding for fear of their ability to keep their infants satiated and well-nourished (Kaufman, Deenadayalan, & Karpati, 2009; Li, Fein, Chen, & Grummer-Strawn, 2008). Low exclusive breastfeeding rates may contribute to

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\* Corresponding author at: Old Dominion University School of Nursing, Norfolk, VA 23529.

E-mail address: [dcartage@odu.edu](mailto:dcartage@odu.edu) (D. Cartagena).

unhealthy feeding practices such as overfeeding resulting in an increased risk for obesity in Latino infants (Cartagena et al., 2014).

Breastfed infants are less likely to become overweight or obese than formula-fed babies (Holmes et al., 2011). The protective effect of breastfeeding seems attributed at least in part to an increased infant control over the feeding experience (Li, Fein, & Grummer-Strawn, 2008). Maternal feeding patterns vary and determine how infants learn and participate in their feeding. Excessive maternal control during feedings may interfere with infant's ability to self-regulate intake and display clues of satiety (Li, Fein, & Grummer-Strawn, 2008), and have been associated with unhealthy feeding and weight gain in children (Worobey, Islas Lopez, & Hoffman, 2009; Thompson et al., 2009; Farrow & Blissett, 2006). A study of 368 Latina mothers participating in WIC programs reported that 50% of the participants described tendencies toward more 'pressure feeding' or controlling maternal feeding patterns, as they always promoted bottle-emptying practices (Gross et al., 2010). Maternal controlling feeding patterns may contribute to higher energy intake and thus represent an important preventable and modifiable risk factor for the prevention of obesity in early childhood.

Recent evidence suggests that infant weight gain is primarily related to energy intake (Lakshman, Elks, & Ong, 2012). Hispanic infants receiving non-exclusive breastfeeding or formula feeding exclusively tend to have higher than recommended energy intakes positively associated with infant weight and body mass index (BMI) in childhood (Ong, Emmett, Noble, Ness, & Dunger, 2006). A large longitudinal study revealed that in contrast to non-exclusive breastfeeding and formula feeding, infants exclusively breastfed for four months showed a decreased risk for overweight and obesity between 2 and 6 years of age (Holmes et al., 2011). Several studies have documented that formula fed infants have higher intakes of energy (Ong et al., 2006) and protein (Koletzko et al., 2009) than breastfed infants. Similarly, Reifsnider and colleagues (Reifsnider & Ritsema, 2008) reported significant differences in the dietary intake of overweight Mexican American infants and toddlers. Overweight infants had significantly higher daily intakes of energy-dense foods plus shorter duration of breastfeeding compared to normal growing infants. The dietary intake of infants represents another important modifiable risk factor that requires considerable attention as researchers seek to understand disparities in health outcomes affecting Latinos.

Although the existing literature described Latina mothers' beliefs and underlying reasons for their infant feeding practices (Cartagena et al., 2014), studies that examine modifiable feeding risk factors are limited and focused on other minority groups (Thompson & Bentley, 2013). A better understanding of modifiable feeding factors determining infant weight gain is of great importance to develop targeted interventions necessary to promote healthy feeding habits and prevent health disparities like obesity. The primary aim of this study was to explore differences in modifiable feeding factors (maternal feeding practices, feeding pattern, and dietary intake) by overweight status (>85% weight-for-length) in the first year of life. For the purpose of this study, feeding practices were defined as maternal feeding behaviors relating to what babies are fed and how often; and feeding pattern as the maternal approach to controlling her infant's feeding behaviors. The term overfeeding was previously defined in the literature as "feeding behaviors that lead to an energy intake for the infant that exceeds the requirements for normal growth and development" (Cartagena et al., 2014).

## 2. Methods

### 2.1. Study design and subjects

The initial study, described elsewhere (Cartagena et al., 2015), consisted of a cross-sectional design study examining factors that contribute to infant overfeeding in Latina mothers. Low-income immigrant Latina mother and infant dyads were recruited from WIC offices in southeastern cities of the United States. All mothers were WIC eligible, at least 18 years old with one healthy infant between 4 and 12 months of age. A

native Spanish-speaking investigator obtained informed consents and administered the surveys during a single home visit. Sixty-two mothers and infants participated in the study. The University and State Health Department Institutional Review Board (IRB) approved the study.

### 2.2. Measurements

#### 2.2.1. Demographics

Maternal, infant and household characteristics were obtained. Maternal characteristics included: age, educational level, marital status, employment status, and number of children. Mother's perceived and desired weight status of her infant was measured using the Baby Rating Scale (BRS). The BRS consists of a line drawing continuum of nine babies who differ in size. Response options range from 1 (*leanest*) to 9 (*heaviest*). Mothers were asked to indicate: (a) where they perceive their infant to be on the BRS (perceived weight), and (b) where they would like their infant to be on the BRS (desired weight). Infant's birth weight and length were obtained from WIC records. Household characteristics included: number of people living at home and food security. A subscale from the Latina Mothers Child Feeding Practices Questionnaire (LMCFPQ), 'making ends meet,' (Lindsay et al., 2011) was used to measure level of food security in the home (subscale's internal consistency ( $\alpha$ ) was .62).

#### 2.3. Anthropometrics

Infant weight was measured on a digital scale to the nearest 0.1 kg and recumbent length was measured to the nearest 0.1 cm with a portable length board. Infant weight-for-length percentiles were calculated using the World Health Organization (WHO) 2006 growth charts (Centers for Disease Control, 2010) and converted to z scores to allow for group comparison. For the purpose of this study, we defined infants at >85th percentile weight-for-length as overweight, and healthy infant weight as <85th percentile weight-for-length.

#### 2.4. Feeding practices

The Infant Feeding Scale (IFS) was used to measure maternal feeding practices relating to types and frequency of foods fed to the infant. The IFS includes two subscales: food frequency scale and feeding environment scale (Horodyski et al., 2011). For this study, questions from the food frequency subscale that related primarily to breastfeeding, formula feeding and introduction of solids, were included in the analysis. With the exception of number of breastfeeding days, these variables were dichotomized as "1- yes" and 2- no."

#### 2.5. Feeding pattern

The Infant Feeding Styles Questionnaire (IFSQ) was used to measure maternal beliefs and approaches to controlling her infant's feeding behaviors (Horodyski et al., 2011). The instrument consists of two subscales: maternal feeding beliefs and maternal feeding style. The IFSQ was revised to measure maternal feeding style in a large multi-state longitudinal randomized controlled trial that included Latino and Black infants (Horodyski et al., 2011). In this study, the maternal feeding style subscale's internal consistency ( $\alpha$ ) was .94.

#### 2.6. Dietary intake

Infant's dietary intake was estimated through a 24-hour diet recall during the home visit. Each mother was asked to remember and report all the foods and beverages consumed by the infant in the previous day using food models, measuring cups, and serving bowls to assist in the clarification of portion sizes. The food intake for 24 hours was analyzed for nutrient content using the Food Processor III (ESHA Research, Salem OR), a computer based software application composed of 50,000 + food items.

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