ABSTRACT

Purpose: To specifically examine infant feeding practices in a sample of young mothers.

Study Design and Methods: A cross-sectional, descriptive/exploratory design with author-developed measures was used to assess maternal demographics, and knowledge of and practices related to infant (6–12 months of age) feeding.

Results: Numerous inappropriate feeding practices were identified in this sample of predominately low-income, African American young mothers (n = 67). More than half (52%) of the mothers had a BMI ≥ 25, with 27% having a BMI ≥ 30. Most mothers attempted to breastfeed (53%), but only 25% breastfed beyond 6 months. Inappropriate food choices for infants (such as french fries), practices such as putting cereal in their babies’ bottles (82%), and starting solid foods before 6 months of age (64%) were reported. In this study, a shift from a balanced diet including adequate fruits and vegetables toward less nutrient-dense foods occurred when infants were approximately 7 to 9 months of age.

Clinical Implications: Most mothers in this study were overweight themselves, and had initiated less than optimal feeding practices in their young children. Given the identified relationship between a mother’s diet and her infant’s diet over time, it is clear that nurses should consider developing interventions to both promote early healthy infant feeding practices and assist young mothers to improve their nutrition simultaneously. Nurses can also target grandmothers and other family members who provide infant care in attempting to improve family nutrition.

Key Words: Complementary feeding; Feeding methods; Infant nutrition; Young mothers.

Infant Feeding Practices of Young Mothers

Rapid weight gain during infancy increases the risk of child and adult obesity (Ong, Emmett, Noble, Ness, & Dungan, 2006; Stettler, Kannanyika, Katz, Zemel, & Stallings, 2003). In the last 3 decades the prevalence of obesity among American children has doubled and even tripled across some groups (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010; Ong et al., 2006). Almost one quarter of children 2 to 5 years of age are now at or above the 85th percentile on the BMI chart, with higher percentages among some ethnic groups (Ogden et al., 2010). All of these dire statistics mean that health problems such as hypertension, type 2 diabetes mellitus, asthma, dyslipidemias, and sleep disorders (all known to be linked to being overweight) are on the rise. Evidence is growing that even preschoolers and school-aged children are developing complications from being overweight, including metabolic conditions and risk factors for later cardiac disease (Cali, & Caprio, 2008; Williams, Strobino, Bollella, & Brotanek, 2004).

The foods that mothers feed their children, coupled with how they feed them, develop the foundation for food consumption throughout life (Savage, Fisher, & Birch, 2007). Mothers decide if they will breastfeed, when to initiate solid foods, and the amount and type of solid foods, juices, and other nonmilk substances they will give their infants. Although breastfeeding is frequently noted to be protective against the development of obesity (Bergmann et al., 2003; Gillman, 2002; Owen, Martin, Whincup, Smith, & Cook, 2005), only 77% of all women actually initiate breastfeeding, and 40% continue to breastfeed for at least 6 months (McDowell, Wang, & Kennedy-Stephenson, 2008). The percentage for young mothers is even lower with only 43% of mothers under the age of 20 years initiating breastfeeding (McDowell et al., 2008). Ong et al. (2006) have suggested that dietary intake at the age of 4 months may be predictive of the risk for childhood obesity, and findings from prior studies suggest that mothers routinely tend to overfeed their infants and have difficulty providing a balanced amount of calories and nutrients (Devaney, Ziegler, Pac, Karwe, & Barr, 2004; Skinner, Ziegler, Pac, & Devaney, 2004). One of the foods that has been implicated in consumption of excessive calories in infants is juice, a...
commonly fed food item during infancy (Bonuck & Kahn, 2002; O'Connor, Yang, & Nicklas, 2006). Typically, infants are fed a variety of fruits and vegetables, but prior studies have concluded that the quality and quantity of fruits and vegetables decrease quickly in the last part of the first year of life (Fox, Pac, Devaney, & Jankowski, 2004). Reasons for this remain unclear.

As a group, younger women with low educational and low socioeconomic status have been shown to breastfeed less often, initiate solid foods sooner, and provide less nutritious foods to their children than a similar group of older mothers (Dennis, 2002; Fein, Labiner-Wolfe, Scanlon, & Grummer-Straw, 2008; Spear, 2006). Younger mothers also have less knowledge of nutrition and infant developmental milestones related to eating and tend to rely on their own mothers for information about feeding their children (Black, Siegel, Abel, & Bentley, 2001). In many studies about infant feeding, young mothers are compared with older mothers (Dennis, 2002; Fein et al., 2008; Spear, 2006), and this has made it difficult to discern whether the differences found between the maternal age groups are related to their age or development, or might be a function of their educational level and socioeconomic status (Fein et al., 2008; Spear, 2006). This study was designed, therefore, to specifically examine the infant feeding practices in a sample of young mothers, not comparing them with other, older mothers, and was important to do in order to discover specific inappropriate feeding practices among young mothers that might be most amenable to targeted interventions. With the increasing linkages between early feeding and later obesity, gaining more understanding about these practices in order to promote healthy feeding for this high-risk group of mothers and infants is critical.

Study Design and Methods

A descriptive/exploratory design was used, and an author-developed measure assessed maternal demographics, and knowledge of and practices related to infant feeding. The study was conducted in a large metropolitan area in the Southeastern United States. After receiving Institutional Review Board approvals, a convenience sample of 70 first-time young mothers were approached and recruited from a primary care pediatric clinic and a Women, Infant, and Children (WIC) clinic in the area. All interviews were conducted in person by the first author. To be included in the study, participants had to be (1) a first-time mother between 15 and 22 years of age, with an infant between the ages of 6 and 12 months (gestational age at birth commonly fed food item during infancy (Bonuck & Kahn, 2002; O'Connor, Yang, & Nicklas, 2006). Typically, infants are fed a variety of fruits and vegetables, but prior studies have concluded that the quality and quantity of fruits and vegetables decrease quickly in the last part of the first year of life (Fox, Pac, Devaney, & Jankowski, 2004). Reasons for this remain unclear.

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Inappropriate infant feeding practices can predispose children to poor eating habits, obesity, and health problems throughout their life.


...and level of education. Maternal BMI was calculated from these data by dividing weight in kilograms by height in meters squared, following the guidelines of the National Institutes of Health (NIH, 1998).

Maternal practices and knowledge for infant feeding were assessed by a survey developed from similar questions used by Barton (2001). Before administration, the survey was critiqued for content and format by two pediatric nurse specialists and the medical director of maternal-child health for a local health department, a medical center dietician, and the director of the local WIC clinics. The survey included a single 24-hour diet recall and questions about initial type of infant feeding; current type of feeding; reasons for discontinuation of breastfeeding; sources of support; type, number, and quantity of feedings; timing of introduction of solid foods; and the quantity of additional nonmilk beverages in the infant’s diet, including water intake. Average daily fluid intake of the infants was determined from the 24-hour diet recall histories. To help mothers best estimate quantities of liquids and portions of foods, several sizes of bottles, “sippy cups,” and baby food jars were available as examples, along with measuring spoons and cups. Additionally, the mothers were asked general questions related to the timing and introduction of foods for infants (e.g., How do you mix the formula?, When should a baby start drinking cow’s milk?, When should you start a baby on eggs?). All data were entered into an SPSS (Version 13) for analysis. Frequency distributions were used to summarize nominal and ordinal data; means and standard deviations were used for continuous data.

### Results

Complete data were obtained from 67 young women between 15 and 22 years of age (M = 19.5 years, SD = 1.5). Their infants ranged between 6 and 12 months of age (M = 8.5 months, SD = 2.3). Table 1 provides an overview of maternal and infant characteristics. The majority of women had completed high school and identified themselves as African American (65.7%). Over 75% of the young women reported living in households with an annual income under $25,000. The majority (61.2%) of the infants were female, products of full-term deliveries, and reportedly in excellent health. Most (79%) were female, products of full-term deliveries, and reportedly in excellent health. Most (79%) of the infants were enrolled in the WIC program. BMI values for the mothers ranged from 17.23 to 49.24, with a mean score of 26.74 (SD 7.3). The majority (52%) of the sample had a BMI >25 (e.g., defined as overweight), with 26.9% of the women having a BMI >30, which would categorize them as obese per NIH guidelines.

### Initial Infant Feeding Practice

Table 2 presents some of the infant feeding practices found. About half (n = 34; 50.7%) reported attempting to breastfeed their infant; 10 mothers (29.4%) reported breastfeeding up to or last 6 months of age, with two of these mothers breastfeeding their infants until 1 year of age.

### Table 1. Maternal and Infant Characteristics (N = 67)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>M (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age</td>
<td>19.5 years (1.5)</td>
<td>15-22</td>
</tr>
<tr>
<td>Maternal education</td>
<td>12 years (1.4)</td>
<td>8-16</td>
</tr>
<tr>
<td>Infant age</td>
<td>8.45 months (2.3)</td>
<td></td>
</tr>
<tr>
<td>Infant gestational age</td>
<td>39 weeks (2.6)</td>
<td>30-42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>Frequency %</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>65.7</td>
<td>44</td>
</tr>
<tr>
<td>White</td>
<td>28.4</td>
<td>19</td>
</tr>
<tr>
<td>WIC</td>
<td>79</td>
<td>53</td>
</tr>
<tr>
<td>Household income ≤ 25,000</td>
<td>76</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maternal body mass index</th>
<th>Frequency %</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Normal weight</td>
<td>41.8</td>
<td>28</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.3</td>
<td>17</td>
</tr>
<tr>
<td>Obese</td>
<td>26.9</td>
<td>18</td>
</tr>
</tbody>
</table>

WIC = Women, Infant, and Children.

### Table 2. Infant Feeding Practices of Young Mothers

<table>
<thead>
<tr>
<th>Attempted to breastfeed</th>
<th>Frequency</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastfed at least 6 months</td>
<td>50.7</td>
<td>34</td>
</tr>
<tr>
<td>Incorrectly prepared formula</td>
<td>27</td>
<td>18</td>
</tr>
<tr>
<td>Gave ≥ 6 ounces of juice a day</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>Gave ≥ 8 ounces of water a day</td>
<td>66</td>
<td>44</td>
</tr>
<tr>
<td>Gave ≥ 32 ounces of formula/milk a day</td>
<td>37</td>
<td>25</td>
</tr>
<tr>
<td>Put cereal into bottle</td>
<td>79</td>
<td>53</td>
</tr>
<tr>
<td>Started solid foods at 4-6 months of age</td>
<td>87</td>
<td>57</td>
</tr>
<tr>
<td>Unaware of contraindications of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>76</td>
<td>51</td>
</tr>
<tr>
<td>Honey</td>
<td>64</td>
<td>43</td>
</tr>
<tr>
<td>Peanut butter</td>
<td>57</td>
<td>38</td>
</tr>
<tr>
<td>Fed infant in front of TV</td>
<td>58</td>
<td>28</td>
</tr>
</tbody>
</table>
and one reporting that she planned to breastfeed until at least 1 year of age (her infant was 6 months old at the time of the interview). At the time of the interview, a majority of the infants were predominately drinking either formula or cow’s milk (92.5%, n = 62). Attempts to quantify the amount of breast milk consumed by infants in a feeding through pre- and postfeeding weights were unsuccessful; thus, only quantities of formula or milk are presented. Mean daily intake of formula and/or cow’s milk was 31.5 ounces (SD 13, range 6–80 oz). In addition to formula intake, the majority of infants were also drinking fruit juice and water on a daily basis. Almost 45% (n = 30) of the mothers reported that their infants were drinking more than six ounces of juice a day (M = 6.6 oz, SD 6.0, range 0–32 oz). Approximately 21% (n = 14) of the mothers reported giving their infant sips or small amounts of soda, tea, sports drinks, and/or fruit punches on a daily basis. The average daily intake of water for the infants was 4.6 ounces (SD 5.1), with some infants not drinking any additional water and one drinking as much as 18 ounces a day.

Secondary or Complementary Foods

For this sample, the addition of secondary or complementary foods began most commonly with the addition of infant cereal to the bottle (Table 2). Almost 80% (n = 53) of the mothers reported putting cereal in their infant’s bottles. A little more than half of the infants (52.8%, n = 28) were given cereal in their bottle before the recommended minimum age of 4 months. When asked why they added cereal to their infant’s bottles, a high proportion of mothers (40.2%, n = 21) responded that their infant was not full on formula alone and therefore was fussy. In addition, numerous mothers (23.9%, n = 12) reported adding cereal to the bottle to help the infant sleep longer at nighttime. Only five mothers (2.7%) reported adding cereal to the bottle, per healthcare provider advice, to help with infant reflux or spitting.

Aside from simple infant foods of pureed fruits, vegetables, and meats, many of the infants were being fed additional food from the table. Mashed potatoes and macaroni and cheese were noted by the majority (56.7%) of mothers to be foods that they had introduced to their infants. French fries were frequently reported as a favorite food of infants in this sample. Many of these infants were fed predominately table food, as long as it could be mashed to a consistency that could be “gummed” by an infant. A few mothers (N = 3) also described how they prechewed table food for their infant to eat. Additional foods that were noted by the mothers included eggs, potato chips, cheese puffs, pizza, peanut butter and crackers, ramen noodles, canned sausages, and even crab meat.

Many mothers were unaware of information regarding foods that were potentially allergenic or that may put their children at risk for infection. For example, when asked about the timing and process for the introduction of eggs to the diet of an infant, 76% (n = 51) reported being unaware of any information about allergies. Approximately 64% (n = 43) were unaware of the appropriate time to wait to introduce peanut butter to their infant, and only 43.3% (n = 29) were aware of the potential hazards of introducing an infant under 1 year of age to honey. Of the mothers who were aware of the risk of honey, very few could actually verbalize the risk for botulism infection. Mothers just reported knowing that you should not give an infant honey.

When asked who they turned to for advice and information on feeding their infant, the majority (n = 52, 77.6%) of the young mothers reported relying on themselves, their mothers, or their grandmothers. Only eight mothers (11.9%) reported a healthcare professional as being the most influential person in advising them how to feed their infant.

Figure 1 depicts the number of servings of fruits and vegetables that infants received in a day. Three age groups were created for comparison purposes. Groupings were based on the expected number of servings of fruits and vegetables by age in months based on national recommendations (AAP, 2009; Shelov, 2004). The first group of infants was 6 months old, the second group included infants 7 to 9 months of age, and the third group included infants 10 to 12 months old. The majority of infants who were 6 months of age (N = 24), were being given two or more servings of fruits and vegetables a day (54.2%, n = 13). Two infants were not eating anything other than infant cereal and had not been introduced to any other solid foods. Of the infants ages 7 to 9 months (N = 21), only 14.3% (n = 3) of the infants were receiving the recommended amount of fruits and vegetables. Among the 10- to 12-month-old infants (N = 22), only 2 (9.1%) of the infants were receiving the recommended number of fruits and vegetables. Six (27.3%) of these infants were not receiving any fruits or vegetables in their diet.

Limitations

The descriptive and cross-sectional nature of this study limits the ability to identify any causal relationships including the effect of the feeding practices on the actual...
outcome of infant growth. The convenience sample of young mothers limits the generalizability of the findings to other samples. In addition, collection of a second diet recall might have strengthened the reliability of the mother’s report of their infant’s diet.

Clinical Implications

Findings from this study extend current knowledge regarding infant feeding practices of young mothers. Similar to other studies (McDowell et al., 2008), the incidence of breastfeeding beyond the early postpartum period was low. Many of the mothers were giving their infants quantities of formula or milk, juice, and water, which were higher than national recommendations. Over 40% of the infants were drinking more than the AAP (2009) recommended 4 to 6 ounces of juice per day. High intake of juice may lead to unneeded calories and replace needed nutrients from breast milk and formula. Many mothers were adding more than the recommended amount of water to prepare the infant formula. Young mothers may be adding additional water to “stretch” limited formula supplies or use water (and juice) in the place of formula to calm a crying baby. These findings are consistent from clinical reports of nurses and other healthcare providers (Keating, Schears, & Dodge, 1991).

In this study, a majority (54%) of 6-month-old infants were receiving the recommended amount of fruits and vegetables, whereas only 14% of 7- to 9-month-old, and 9% of 10- to 12-month-old infants were receiving the recommended amount. This finding is similar to recent reports that as infants age, the number of servings of fruits and vegetables decreases, with 18% to 33% of infants and young children ages 7 to 24 months eating no servings of fruits and/or vegetables in a day (Fox et al., 2004). This finding is consistent with national studies that identify significant negative changes in the nutrient balance of young children’s diets, occurring in the first year of life, identifying a key time for intervention (Devaney et al., 2004; Fox et al., 2004; Skinner et al., 2004).

Results from this study suggest that infant diets mirror maternal diets and eating habits as early as 7 months of age. Consistent with previous studies (Lee, Hoerr, & Schiffman, 2005), maternal dietary quality may be an effective proxy or assessment of the nutritional quality of their infant’s diet. This is concerning, as a majority of the young mothers (52%) in this sample already had a BMI >25. Many of the mothers (58%) reported feeding their infants essentially what they were eating and often while watching television. In this study, the shift from a balanced diet including adequate fruits and vegetables toward less nutrient-dense foods occurred at approximately 7 to 9 months of age.

A majority (79%) of the infants in this study were enrolled in the WIC program. The goal of the WIC program is to improve the diets of infants and children by providing supplemental foods and nutritional education for mothers (Ponzia, Devaney, Ziegler, Reidy, & Squatrito, 2004). Despite the focused efforts of WIC, study findings reported here suggest that some mothers have inadequate knowledge and skills related to infant feeding. However, poor infant diets may also reflect an inadequate level of food security (Casey et al., 2006). For many of these low-income mothers, limited or uncertain access to enough nutritious food may be a very real concern and be reflected in the dietary habits of their household. Resources, such as WIC, are only supplemental and young mother’s feeding practices may be their best attempts to feed their child within their means.

Nurses need to be concerned about how to use the results of this study to best help young mothers and their infants. Given the relationship between a mother’s diet and her infant’s diet over time, we believe that nurse-developed interventions to promote early healthy infant feeding practices must include strategies aimed at increasing maternal nutrition. Nurses can use this study to reinforce the need to work closely with young mothers to teach the appropriate preparation of formula, the balance of liquids in their infant’s diet, and how to appropriately identify and respond to infant cues.

Based on the number of inappropriate and unsafe feeding practices noted in this sample, many young mothers may be receiving incorrect and sometimes dangerous information about what to feed infants. This finding underscores the importance of including others aside from the mother in nutritional teaching at well-infant visits, such as grandmothers and other family members who provide

Clinical Implications

Nurses who work with young mothers and their infants should:

- Include strategies aimed at improving maternal nutrition in order to help improve infant nutrition.
- If formula is being used, teach the appropriate preparation of formula, the balance of liquids in infant’s diet, and how to identify and respond to infant cues of hunger.
- Include influential family members such as grandmothers and other family members in the teaching plan, especially if they are involved with infant care and meal preparation.
- Consider referrals to resources such as home visitation programs, telephone help lines or food banks.
infant care and may be involved in actual meal preparation. In addition, it is important to remember that inappropriate feeding practices may reflect inadequate knowledge, but could also be a sign of inadequate food security (Casey et al., 2006). Making referrals to available community supports and resources such as home visitation programs, telephone help lines, or food banks should be considered for young mothers.

Future Research
Study findings highlight the need for longitudinal studies to assess infant feeding practices and the actual influence on infant growth measures. Qualitative strategies such as focus groups or in-depth individual interviews may also help identify key factors not yet delineated, which may influence mothers as they seek to make choices about their and their infant’s diet and health. More studies are needed to better understand how young mothers decide what and when to feed their young infants and who influences their decision making. Future studies would also benefit from the addition of a specific measure of household food security to further identify contextual factors that may be influencing young mother’s infant feeding practices.

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