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Adherence to Vitamin D Recommendations Among US Infants Aged 0 to 11 Months, NHANES, 2009 to 2012

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In 2008, the American Academy of Pediatrics (AAP) revised their recommended minimum daily intake of vitamin D for infants and children to 400 IU.¹ This was based on the high prevalence of vitamin D deficiency, persistent incidence of rickets, and historical safety profile of 400 IU daily supplementation in infants and children.¹ The AAP recommends that vitamin D supplementation should begin within the first few days of life and continue until the infant is consuming at least 1 liter of vitamin D–fortified formula or milk per day. Breastfed infants are at increased risk of vitamin D deficiency because human milk generally does not contain sufficient vitamin D, while infant formula is fortified to provide approximately 400 IU of vitamin D per liter (at normal dilution).² Adherence to the revised recommended vitamin D intake guidelines has not been evaluated since enactment.

The objective of our analysis was to evaluate the percentage of US infants meeting the 2008 AAP vitamin D recommendations during 2009 to 2012.

Methods

We analyzed data from the 2009 to 2012 National Health and Nutrition Examination Survey (NHANES), a cross-sectional continuous survey of noninstitutionalized persons in the United States.³ An adult proxy, generally a parent, completed the dietary recall for participants less than 6 years of age, providing information about all food, beverages, and supplements consumed during the 24 hours prior to the interview. All analyses accounted for the multistage, complex sampling design and used the day-1 dietary recall weights.

Infants (0–11 months) with dietary recall information were included in our analysis (n = 739). We estimated the percentage meeting the 2008 AAP vitamin D recommendations on a

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Author Contributions

KAA takes responsibility for the accuracy of the data analysis. KAA, LMR, and AES contributed to the study design, analysis, interpretation and drafting of the manuscript.

The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the National Center for Health Statistics, Centers for Disease Control and Prevention.

Declaration of Conflicting Interests

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given day, defined as either consuming at least 1 liter of infant formula and/or receiving a supplement of at least 400 IU vitamin D. Additionally, we estimated adherence to vitamin D recommendations by age of infant (0–5 months vs 6–11 months) and breast-feeding status, separately. Breastfeeding included both exclusive (breastmilk only) and partial (breastmilk plus formula and/or solid food). Estimates were compared using the χ^2 test.

Results

During 2009 to 2012, 27.4% (95% confidence interval [CI] = 24.1, 30.9) of US infants (0–11 months) met the recommendations for vitamin D intake on a given day, which did not differ by infant age (30.6% for 0–5 months vs 24.3% for 6–11 months; $P > .05$). Figure 1 shows breastfed infants were less likely to meet the recommendations compared with non-breastfed infants (19.3% vs 31.4%; $P < .01$). Of the breastfed infants who met the recommendation, most did so through vitamin D supplementation (96.4%; 95% CI = 84.8, 99.8) rather than consuming a liter of formula. Of the non-breastfed infants who met the recommendation, most did so through formula consumption (86.8%; 95% CI = 77.6, 93.2), not vitamin D supplementation.

Discussion

Approximately one quarter of US infants aged 0 to 11 months met the 2008 AAP vitamin D recommendations on a given day in 2009 to 2012. Fewer than 1 in 5 breast-fed infants met the vitamin D recommendations compared to nearly 1 in 3 non-breastfed infants. We found that the majority of US infants were not adhering to the current vitamin D recommendations in the previous 24 hours, which was similar to estimates of infants not meeting the 2008 recommendations during 2005 to 2007.⁴ Our study only evaluated one 24-hour period; adherence to recommendations based on usual intake remains unknown and results based on usual intake could differ from the results based on a single day's intake. Reasons for low vitamin D supplementation might be varied, but could be because many pediatric health care providers do not recommend vitamin D supplementation to their patients.^{5,6}

The findings from our study show a gap between current vitamin D intake and the 2008 AAP vitamin D recommendations for US infants, particularly for breastfed infants.

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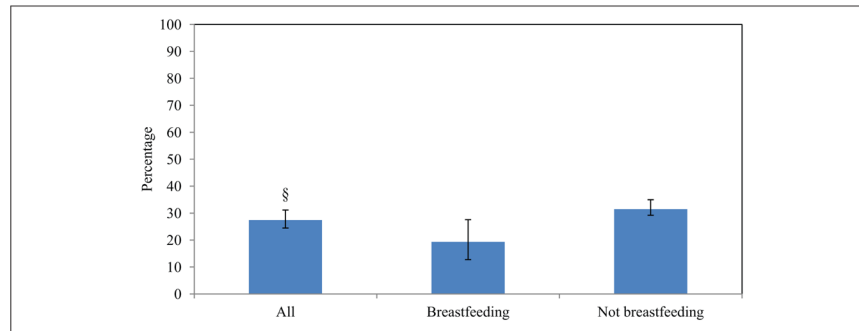


Figure 1. Adherence to current vitamin D recommendations on a given day among US infants aged 0 to 11 months by breastfeeding status, NHANES, 2009 to 2012.

Abbreviation: NHANES, National Health and Nutrition Examination Survey.

§95% confidence interval.

Adherence to the 2008 American Academy of Pediatrics vitamin D recommendations on a given day was defined as either consuming at least 1 liter of infant formula and/or receiving a supplement of at least 400 IU vitamin D within the 24 hours prior to interview. The unweighted number of infants included in the sample was 739 (216 breastfeeding and 523 not breastfeeding).