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Body Mass Index and Dietary Intake among Head Start Children and Caregivers

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ABSTRACT

Background The US Head Start program serves low-income preschoolers and their caregivers and provides an opportunity for assessment and intervention on obesity. We sought to determine the prevalence of obesity among children and their caregivers and to identify variables that are associated with child body mass index (BMI) *z* scores and caregiver BMI.

Design/setting Cross-sectional data on diet and BMI from 770 caregiver–child dyads recruited from 57 Head Start centers in Alabama and Texas.

Methods Height and weight of each caregiver and child were measured using standardized protocols. Dietary intakes of caregiver–child dyads were collected using three 24-hour dietary recalls and Block food frequency questionnaires. Data were collected between September 2004 and November 2005. The larger Food Pyramid categories were divided into 17 food consumption groups and tested for their association with child BMI *z* scores. Analysis of variance was used to test if food groups were significantly associated with child BMI *z* score.

Results The prevalence of obesity among children was 18.4%, 24.3%, and 37.3% among black, Hispanic, and white children, respectively ($P<0.0001$), whereas it was 58.3%, 41.4%, and 41.6% among black, Hispanic, and white caregivers, respectively ($P<0.0001$). Child BMI *z* scores and caregiver BMIs were correlated ($r=0.16$, $P<0.0001$). In multivariable models, children were 1.90 (95% confidence interval 1.31-2.74) times more likely to have BMI ≥95th percentile if their caregiver was obese. Five variables (fruits, unsweetened beverages, low-fat dairy, race, and caregiver's BMI) were significantly associated with child BMI *z* scores. Fruits were inversely related, whereas unsweetened beverages, low-fat dairy, and caregiver's BMI were positively associated with child BMI *z* score ($P<0.03$). Compared to whites, black and Hispanic children had lower BMI *z* scores ($P<0.05$).

Conclusions The high prevalence of obesity in this population together with the observed inverse association between fruit consumption and BMI, if replicated in other studies, suggests that interventions that promote fruit consumption could have beneficial effects on child BMI.

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Obesity is a significant problem in the United States (1-5), and the prevalence of overweight and obesity among children and adolescents is high and rising (6). According to National Health and Nutrition Examination Survey 2003-2006 data, the prevalence of obesity (≥95th percentile of body mass index [BMI] for sex and age, based on the 2000 Centers for Disease Control and Prevention [CDC] reference population) among children aged 2 to 5 years was 12.4% (6). Obese preschoolers are particularly at risk because of the strong tracking of overweight and its associated comorbid conditions in adulthood (7-12). Further, the preschool years are a critical time when individual attitudes and behaviors are shaped (13). Obesity and its associated risk behaviors are more prevalent and severe in low-income preschoolers living in socially disadvantaged, obesogenic environments (14-18). Parental obesity and parenting styles influence children's diet quality, activity level, and BMI (19-25). The family risk for obesity reflects genetics, parenting, foods offered, and the shared living environment. The neighborhood environment, for example, affects access to healthy vs unhealthy foods and the potential for active vs sedentary behaviors. Understanding caregiver–child relationships for diet and obesity could help identify specific factors that influence obesity and pave a way for designing interventions for obesity prevention in low-income families where obesity is an increasing public health problem.

Head Start is a national program that promotes readiness for school among newborn to 5-year-old children largely from families with incomes below the poverty line (26). The program is large and served 908,412 low-income children and their families throughout the United States during fiscal year 2007 (27). Head Start is an excellent community setting to assess obesity and its proximate risk behaviors and to target early interventions for obesity in low-income families. In this study the prevalence of obesity among children and their caregivers, the relationships of child BMI and caregiver BMI and child and caregiver dietary intake, and child dietary intake and

child BMI *z* scores in a sample of Head Start caregiver–child dyads are examined.

METHODS

This study was approved by the Institutional Review Boards of The University of Alabama at Birmingham (protocol No. X030702004) and Baylor College of Medicine (protocol No. 14064). All subjects provided written informed consent before participating in the study.

Study Sample

Participants in this study were the 770 caregiver–child dyads recruited from 57 Head Start centers in Alabama and Texas. The purpose of the original study was to identify perceived facilitators and barriers to fruit and vegetable intake among caregivers of preschool children from non-Hispanic black, Hispanic, and non-Hispanic white households enrolled in the Head Start program. The details of this study have been described elsewhere (28). Head Start sites in north-central urban Alabama, northern rural Alabama, and southeastern urban Texas were selected because they serve understudied ethnically diverse, low-income populations in rural and urban areas in the South. The target population for this study was children aged 3 to 5 years enrolled in their first year of Head Start and their primary caregiver, defined as the person responsible for >50% of the child's dietary intake outside of Head Start.

Data Collection Procedures

The program manager and study dietetics practitioner provided quality control over all aspects of data collection, including the training and certification of interviewers and the collection, review, and processing of data for analyses. Interviewers were trained and certified in anthropometric and dietary assessments (24-hour dietary recalls and food frequency questionnaires [FFQs]). Dietary recall and FFQ training and certification was provided to interviewers by the study dietetics practitioner who was trained at the Nutrition Coordinating Center of The University of Minnesota and who had extensive experience in dietary assessment and intervention. Data on age, race, and ethnicity of children and caregivers were obtained from caregivers who were interviewed by the study personnel. Other aspects of data collection procedures are described elsewhere (29).

Anthropometric Measures

Interviewers conducted two height and two weight measurements with each caregiver and each child using standardized protocols (30). Height was measured to the nearest 0.1 cm with a Shorr Adult Height Measuring Board (Shorr Productions, Olney, MD). Weight was measured to the nearest 0.1 kg using a PS-6600 Take-a-Weight electronic scale (Befour, Saulkville, WI). BMI and BMI *z* scores were calculated using Epi Info software (version 3.01, 2003, CDC Epidemiology Program Office, Atlanta, GA) adjusting for age and sex based on the CDC 2000 reference population (31). Caregiver obesity was defined as BMI ≥30 whereas child obesity and underweight were defined as BMI ≥95th percentile and BMI <5th percentile for same age and sex based on 2000 CDC reference population, respectively (31).

Dietary Measures

Two separate dietary measures were used to assess caregiver and child intake and to provide somewhat independent estimates of intake: 24-hour dietary recalls, collected using Nutrition Data System for Research (NDS-R) software (version 5.0_35, 2005, University of Minnesota, Minneapolis) and Block FFQs (32-34). The FFQs capture dietary intake for the last 12 months for caregivers and for the past 6 months for children. For both dietary assessments, the child's intake was reported by the caregiver.

Three nonconsecutive days of 24-hour dietary recalls were obtained for the caregiver and the child according to standardized, multiple pass procedures (35), with at least 1 weekend day of intake collected for each. Two-dimensional food models were used to estimate portion sizes (36). Child intake was reported by the caregiver on the same day as the caregiver's dietary recall and included only foods and beverages consumed by the child when the caregiver was present. Head Start must comply with the Child and Adult Care Food Program guidelines. All meals provided by Head Start must meet US Department of Agriculture/Health and Human Services Commission required meal patterns. Because Head Start meals are regulated in this manner and the study focus is caregiver influences on child intake and BMI, foods and beverages consumed while the child was at the Head Start center were not assessed.

The Swan/Block 01/02 FFQ (32) was administered to caregivers, and the Block Kids 2-7 FFQ (33,34) was administered to caregivers who reported for their Head Start child. Both questionnaires were interviewer-administered and completed face-to-face. The Swan FFQ includes 110 questions about the caregiver's usual dietary intake over the previous 12 months. Both frequency and portion size are measured. The Block Kids 2-7 FFQ includes 90 questions about the child's usual dietary intake in the previous 6 months. For the child FFQ, only the frequency of intake was assessed; portion size was not. Both the child and adult FFQs included foods typically consumed by Hispanics such as avocado, guacamole, salsa, and tortillas.

Food Quality Groups

The NDS-R 24-hour recall intake data and the Block adult and Block child food frequency intake data were reviewed separately for servings of the broader Food Pyramid groups (ie, grains, vegetables, fruits, milk, meat and beans, oils, and discretionary energy). These Food Pyramid groups were examined, and the constituent foods then regrouped based on their energy, fat, and sugar content and customary consumption patterns (eg, ice cream was grouped with desserts rather than with dairy). This procedure resulted in 17 food consumption groups, namely, alcohol, added fats and oils, cakes and desserts, chips, fried vegetables, nonfried vegetables, fruit, fruit juice, high-fat dairy, low-fat dairy, low-energy beverages, sugar-sweetened beverages, fatty meats, lean meats, whole grains, sweet condiments, and refined grains.