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Acculturation, Dietary Practices and Risk for Childhood Obesity in an Ethnically Heterogeneous Population of Latino School Children in the San Francisco Bay Area

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Abstract

Previous studies have found increased acculturation to the US lifestyle increases risk for obesity in Latinos. However, methodologies differ, and results in children are inconsistent. Moreover, previous studies have not evaluated risk factors within the heterogeneous US population. We recruited 144 self-identified Latino school children and their mother or father in grades 4–6 in San Francisco parochial schools and South San Francisco public schools using an information letter distributed to all students. Children and parents had weights, heights, demographic information, dietary patterns and lifestyle variables collected in English or Spanish through an interview format. A high percentage of our children were overweight [85th percentile body mass index (BMI)] (62.5%) and obese (95th percentile BMI) (45.2%). Correspondingly parents also had a high percentage of overweight (BMI 25 & <30) (40.8%) and obesity (BMI 30) (45.3%). Mexico was the country of origin for 62.2% of parents, and 26.6% were from Central or South America. In multivariate logistic analysis, speaking Spanish at home was an independent risk factor for obesity [odds ratio (OR) 2.97, 95% confidence interval (CI) 1.28–6.86]. Eating breakfast daily (OR 0.34, 95% CI 0.15–0.78) and consumption of tortas (a Mexican fast food sandwich) (OR 0.45, 95% CI 0.21–1.00) were associated with decreased risk. In stratified analysis, significant differences in risk factors existed between Mexican origin versus Central/South American Latino children. The processes of acculturation likely impact eating and lifestyle

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practices differentially among Latino groups. Interventions should focus on ensuring that all children eat a nutritious breakfast and take into consideration ethnicity when working with Latino populations.

Keywords

Pediatric overweight; Pediatric obesity; Latino health; Acculturation; Breakfast

Background

Obesity and Acculturation

The increase in childhood obesity is a public health concern in the United States [1]. Latinos have been disproportionately impacted with a higher prevalence of obesity [body mass index (BMI)   95th percentile] (20.9%) compared with non-Hispanic Caucasian children (15.3%) [1]. Because of these early life disparities in obesity that persist into adolescence and adulthood, childhood risk factors for obesity in Latinos should be delineated. Moreover, few studies have evaluated potentially heterogeneous risk factors in the increasingly diverse Latino US population.

There is growing body of literature, that examines the relationship between acculturation to the United States culture, defined as the process where recent immigrants gradually adopt the habits and beliefs in the new country or place of immigration [2], and risk for obesity in Latinos. Studies in adults and adolescents show that second generation Latinos and those with greater residence time in the United States are more likely to be obese compared with first generation Latinos, primarily due to poor dietary practices and lowered physical activity levels compared with Latinos in their home countries [3–6].

Obesity, Acculturation and Children

In studies with children, the reported relationship between acculturation and obesity has been inconsistent. Sussner et al. [7] found that in 24 month old Latino children (with origins in Central and South America, Puerto Rico and the Dominican Republic), exclusive use of Spanish language, as a marker of lower acculturation, was associated with greater risk for obesity. In contrast, Fuentes-Afflick and Hessol [8] reported that in 3 year old children from Mexico, increased maternal acculturation, measured by a self-defined increase in Americanization, was associated with greater risk for child overweight. In a study of school children enrolled in K-2nd grade in San Diego, the children of parents who were less acculturated, defined an acculturation rating scale for Mexican Americans focused on language use and self-identification [9], were more likely to be overweight [10]. Similarly a study that compared risk for obesity among children of US born versus foreign born Mexican origin mothers found increased risk in the children of US born mothers [11]. However, a study evaluating risk factors for child overweight in Mexican–American children in Chicago did not find any differences in risk associated with acculturation, defined as language and media use and social relations [12]. Some of these reported differences may be explained by variations of definitions and measures of acculturation (e.g., language-based vs. place of birth vs. heritage), by investigations of different age

groups in childhood (younger vs. school-aged vs. adolescents), and by ethnically homogeneous versus heterogeneous samples of Latino populations. We evaluated risk factors for obesity in a diverse group of Latino school children in the San Francisco Bay Area, with a particular focus on the relationship between acculturation, using language based measures of acculturation, ethnic differences and dietary practices.

Specifically, our study, in contrast with previous studies, focuses on the possibility that there may be heterogeneity within Latino groups and that processes of acculturation may differentially impact groups based on country of origin.

Methodology

Settings

Subjects and Recruitment Procedures

San Francisco Bay Area: All self-defined Latino students in grades 4–6 in selected parochial schools (11 elementary schools) in San Francisco and public schools in South San Francisco School District (12 elementary and middle schools) were invited to participate in the study through a letter of invitation in 2004–2006. Some schools had greater than 50% of the students of Latino origin while a portion had only a small minority. Parents could return the letter of invitation with their name and phone number to the school and subsequently the study team contacted the family for an interview. Approximately 90% of those families that returned the information sheet consented to participate in the study.

Data Collection—Two of the authors of the study conducted the structured interviews (JW, NS) in San Francisco, CA at local schools where recruitment was conducted and at participant's homes based on family choice. Children's and parental weights, heights, and waist circumferences (WC) were measured as part of the data collection process. All interviews were conducted in either Spanish or English depending on participant choice from 2004 to 2006.

Anthropometric Measurements—Height was measured to the nearest millimeter with a portable stadiometer (model 214 Rodad Rod, Seca Corp, Hanover, MD, USA). Weight was measured with electronic scales (model 2001, Tanita Corp, Tokyo, Japan) to the nearest 0.1 kg. Body mass index (BMI; in kg/m^2) was subsequently calculated. WC was measured at the minimum circumference between the iliac crest and the rib cage. BMI values for children were compared with age/gender BMI percentiles from the Centers for Disease Control and Prevention Growth Charts [13]. Cutoff points were the 85th and 95th percentiles for overweight and   95th percentile for obesity. WC measurements were compared to CDC growth charts defining >90th percentile for abdominal obesity for children [14].

Questionnaires—We developed a questionnaire in English and Spanish to measure child intake, food insecurity, migration and health history, physical and leisure time activities for use both in Tijuana/Tecate, Mexico and the San Francisco Bay Area as described in Jimenez-Cruz et al. [15]. For some sections of the questionnaire we used previously

validated instruments including the food insecurity questionnaire, dietary intake and psychosocial issues [16–18]]. Parents and children were interviewed separately using similar questionnaires and consistency in results was evaluated. The Committee on Human Research at the University of California, San Francisco approved the study protocol, and written informed consent was obtained from each parent and assent from each child.

Statistical Analyses—The major dependent variable of interest was childhood obesity. The main independent variable was acculturation status based on child and parent's place of birth, use of spoken Spanish versus English in the home or at school, and watching TV in Spanish versus English. We chose these measures of acculturation as previous studies have used language [7, 9] and place of birth or length of residence in US to assess acculturation [3, 4]. Stata 11.0 was used to conduct all analyses. Univariate analyses were conducted to compute means, standard deviations and percentages. Bivariate logistic regression analyses were conducted to assess odds ratios (OR) and 95% confidence intervals (CI). Chi-squared and Student's t test were also conducted in bivariate analyses. Multivariate logistic regression analyses were conducted with all variables that had a $P < 0.10$ in bivariate analyses. Data are expressed as mean ± SD.

Results

We enrolled 144 families in our study. Children were 10.2 ± 1.1 years of age and had a mean BMI percentile of 80.2 ± 25.6 (Table 1). A high percentage (62.5%) were overweight or obese, and 45.2% were obese. Most (81.3%) of the children were born in the United States, while 15.3% were born in Mexico, and 3.5% were born in Central America (Table 1). Mean parental BMI was 30.4 ± 6.9; 40.8% of parents were overweight and 45.3% were obese. In contrast with the children, 62.2% of parents were born in Mexico, 26.6% were born in Central/South America, and 11.2% were born in other places including the US (Table 1).

Several demographic variables were associated with obesity. Speaking Spanish at home [odds ratio (OR) 2.13, 95% CI 1.05–4.34] and having an obese parent (OR, 2.04, 95% CI 1.03–4.04) increased risk of obesity (Table 2). Variables associated with decreased risk for obesity included eating a daily breakfast (OR 0.47, 95% CI 0.23–0.93), consuming pizza one or more times per week (OR 0.55, 95% CI 0.28–1.07), and consuming tortas, a Mexican style sandwich, one or more times per month (OR 0.51, 95% CI 0.25–1.03) (Tables 2). We did not find any association between other demographic, acculturation, physical activity, dietary and other lifestyle variables and risk for obesity. In multivariate analysis, independent predictors for obesity included speaking Spanish at home (OR 2.97, 95% CI 1.28–6.86), while eating breakfast daily (OR 0.34, 95% CI 0.15–0.78) and increased torta consumption were associated with decreased risk (OR 0.45, 95% CI 0.21–1.00) (Table 3).

In stratified analyses to evaluate the possible role of ethnicity interacting with acculturation and other variables on risk for obesity, we found that risk for obesity was not associated with Spanish language use (at home) when evaluating only the Mexican origin children (OR 1.76, 95% CI 0.51–6.10). Similarly, consumption of tortas was no longer protective (OR. 0.83, 95% CI 0.32–2.17). However, for the Central/South American sub-group, these relationships

were still significant, and the effect size was larger. Spanish language use (at home) was associated with increased risk in the Central/South American children (OR 12.62, 95% CI 1.38–115.55). Torta consumption was similarly associated with decreased risk in Central/South American children (OR 0.08, 95% CI 0.006–0.97). For both groups in stratified analysis, increased breakfast consumption continued to be associated with decreased risk for obesity.

Discussion

This is the first study to evaluate the relationship between ethnicity and acculturation in determining risk for obesity in Latino children. In contrast with some other studies [8, 12], we found that decreased acculturation (as measured by use of Spanish language at home) was associated with increased risk for obesity; however, this association was only significant for the children whose families originated from Central/South America. We also found that the consumption of tortas, a Mexican fast food sandwich served on a crusty 6–8 inch white sandwich roll, in this same Central/South American population was also associated with decreased risk for obesity. Tortas are commonly filled with ham, chicken, turkey, steak or beef. For both the Mexican and Central American origin children, regular breakfast consumption was associated with decreased risk.

Other studies that have evaluated the role of acculturation in Latino populations have generally evaluated risk in either in Mexican origin children or Central American/Caribbean children [7, 10]. Alternatively, studies that have had ethnicity diverse samples did not conduct stratified analyses [8, 11]. It is possible that differential acculturation processes impact Latino sub-groups in unique ways. Central/South American communities, in contrast with Mexican origin ones, that live in areas that are separated from mainstream American culture and maintain Spanish language may have different feeding practices or ideas about ideal body weight.

Studies have found feeding differences in mothers based on acculturation status. One study of English and Spanish speaking Latino WIC participants found that Spanish-speaking Latino mothers were more likely to push children to eat more and use positive incentives to get children to eat [19], although this study did not evaluate ethnic differences in feeding attitudes. Guendelman et al. [20] found that place of birth (US vs. Mexico) can impact a mother's perception of her child's ideal weight and corresponding feeding practices with Mexican-based women less likely to recognize childhood overweight. A recent study has shown that low income mothers from three different regions of Mexico initiate high-salt, high-sugar and high-fat snacks as early as during the first 6 months of life [15], and a high percentage of mothers do not consider carbonated and non carbonated sweetened drinks and high-fat content snacks to be unhealthy for infants [21].

We found a protective role of torta consumption on pediatric obesity, primarily in our Central/South American children, and increased pizza consumption neared significance as a protective factor. It is possible that any increase in Latino fast food or more traditional American fast food (e.g. pizza) consumption is associated with increased socioeconomic status, increased acculturation, and potentially decreased obesity in certain sectors of the

Latino population through other mechanisms such as access to better schools or more opportunities for physical activity. The protective effect of tortas consumption is inconsistent with the high mayonnaise and whole cream content of tortas made in Mexico, however, we did not assess the food and nutrient content of tortas produced in the Bay Area. Dietary studies on acculturation processes suggest that fast food consumption increases with moving to or increased residence in the United States, although variations of the impact on Latino ethnic sub groups are uncertain [22].

Demographic data from the California Health Interview Survey (2001) indicate that important socioeconomic and demographic differences exist between Mexicans and Central Americans in California [23]. Central/South Americans are significantly less likely to have incomes below the poverty level or to be US citizens. These important demographic differences need to be further evaluated in subsequent studies as they influence food choices, dietary patterns and other lifestyle factors.

We also found an extremely high prevalence of overweight and obesity, both in the children and adults who were surveyed for this study. Our Committee on Human Research required that the study flyer we used to recruit participants explain that the goals of the study were to evaluate risk factors for obesity, and it is possible that we recruited a disproportionate number of families with a history of obesity or current concern about a child's obesity. However, studies that were larger and with population-based samples have similarly found high prevalence of overweight and obesity. A large, school based study of primarily Mexican origin Latino parent–child pairs from San Diego found a high percentage of obesity in adults (41.3%) as well as overweight (33.8%) and a high percentage of obesity in girls (29.1%) and boys (30.0%) [10]. A similar study from San Francisco found that 42.8% of young children (age 3) were overweight and 36.0% of mothers were obese [8]. Limitations of our study included our relatively small sample size and use of a convenience sample, the use of a cross-sectional methodology which can only assess association and recall bias for questions asked retrospectively.

This study also found a protective role of eating daily breakfast against obesity for the Latino children surveyed. Previous studies have found that those who skip breakfast are at greater risk for obesity [24, 25], however, this is the first study which has found the potential protective effect of eating breakfast among Latino children, a group with a high rate overweight and obesity. School-based interventions or interventions with high risk groups should encourage breakfast eating as a means to reduce obesity in this population.

Conclusion

Future studies should be careful to differentiate within Latino groups concerning the processes of acculturation. Our study indicated that while certain factors such as daily breakfast consumption were protective against childhood obesity irrespective of ethnic background, other factors such as Spanish language use and consumption of tortas were no longer significant in Mexican-origin children but remained significant in Central/South American children in stratified analysis. Future studies and any synthesis of the impact on

acculturation on obesity risk should take care to analyze the differential impact of ethnicity on acculturation in relation to health outcomes.

Acknowledgments

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Table 1

Mean, standard deviation and frequencies for selected characteristics among Latino children and parents in San Francisco Bay Area 2003–2004

	Mean	SD	% (n/Total)
Age, years	10.2	1.1	
Sex, female			50.7 (73/144)
BMI, percentile	80.2	25.6	
BMI 85th percentile			62.50 (90/144)
BMI 95th percentile			45.2 (65/144)
Child country of birth			
United States			81.3 (117/144)
Mexico			15.3 (22/144)
Central America			3.5 (5/144)
Parental BMI	30.4	6.9	
Parental BMI 25 (overweight)			86.1 (118/137)
Parental BMI 30 (obese)			45.3 (62/137)
Parental ethnicity			
Mexico			62.2 (89/143)
Central/South America			26.6 (38/143)
Other including US			11.2 (16/143)
Mother foreign born			80.4 (115/143)
Father foreign born			81.4 (114/140)

Table 2

Prevalence and unadjusted odds ratios (OR) for child obesity, by selected child characteristics, among 144 Latino children in San Francisco Bay Area, CA 2003–2004

	Prevalence of obesity (n)[a]	OR (95% CI)
Demographics		
Sex		
Male	49.3 (35/71)	1.39 (0.72–2.69)
Female	41.1 (30/73)	1.00
Age group, years		
8–9	42.9 (15/35)	1.00
10	44.8 (26/58)	1.08
11	47.1 (24/51)	1.19 (0.50–2.81)
Acculturation		
TV viewing in Spanish		
Yes	46.4 (32/69)	1.14 (0.59–2.20)
No	43.2 (32/74)	1.00
Speak Spanish at home[¥]		
Yes	51.6 (48/93)	2.13 (1.05–4.34)
No	33.3 (17/51)	1.00
Speak Spanish at school		
Yes	45.3 (29/64)	1.04 (0.54–2.02)
No	44.3 (35/79)	1.00
Child foreign born		
Yes	44.4 (12/27)	0.97 (0.42–2.24)
No	45.3 (53/117)	1.00
Mother foreign born		
Yes	44.4 (51/115)	0.92 (0.40–2.11)
No	46.4 (13/28)	1.00
Physical activity and TV/Video viewing		
Participation in sports teams		
Yes	42.6 (26/61)	0.86 (0.44–1.68)
No	46.3 (38/82)	1.00
TV viewing (daily)		
Yes	47.8 (43/90)	1.39 (0.70–2.78)
No	39.6 (21/53)	1.00
Video games		
1×/week	45.5 (45/99)	1.10 (0.54–2.24)
< 1×/week	43.2 (19/44)	1.00
Food habits		
Breakfast (daily)[¥]		
Yes	38.0 (35/92)	0.47 (0.23–0.93)
No	56.9 (29/51)	1.00

	Prevalence of obesity (n)[a]	OR (95% CI)
Soda at school		
Yes	47.1 (41/87)	1.24 (0.63–2.45)
No	41.8 (23/55)	1.00
Bed hungry because not enough money to buy food		
Yes	62.5 (10/16)	2.22 (0.76–6.49)
No	42.9 (54/126)	1.00
Food consumption		
McDonalds/fast food		
1×/week	39.1 (27/69)	0.64 (0.33–1.25)
< 1×/week	50.0 (37/74)	1.00
Soda/sweetened beverages		
1×/week	45.5 (45/99)	1.09 (0.54–2.24)
< 1×/week	43.2 (19/44)	1.00
Beans/frijoles		
1×/week	39.8 (37/93)	0.56 (0.28–1.12)
< 1×/week	54.0 (27/50)	1.00
Salsa picante		
1×/month	38.2 (21/55)	0.66 (0.33–1.32)
< 1×/month	48.3 (42/87)	1.00
Pizza		
1×/week	37.5 (27/72)	0.55 (0.28–1.07)
< 1×/week	52.1 (37/71)	1.00
Fruit juices		
1×/day	37.5 (21/56)	0.62 (0.31–1.21)
< 1×/day	49.4 (43/87)	1.00
Chips/choritos		
1×/week	46.8 (37/79)	1.21 (0.62–2.35)
< 1×/week	42.2 (27/64)	1.00
Tacos		
2×/week	40.7 (11/27)	0.85 (0.36–2.02)
< 2×/week	44.8 (43/96)	1.00
Burritos		
1×/week	39.5 (17/43)	0.74 (0.36–1.52)
< 1×/week	47.0 (47/100)	1.00
Tortas		
1×/month	34.6 (18/52)	0.51 (0.25–1.03)
< 1×/month	51.1 (45/88)	1.00
Parental BMI and demographics		
Parent obese (BMI 30)		
Yes	54.8 (34/62)	2.04 (1.03–4.04)
No	37.3 (28/75)	
Parental years of education		

	Prevalence of obesity (n)[a]	OR (95% CI)
High-school degree or greater	44.6 (45/101)	0.92 (0.45–1.89)
Less than high school degree	46.5 (20/43)	
Mother place of birth		
Foreign born	46.4 (13/28)	0.92 (0.40–2.11)
US Born	44.4 (51/115)	
Father place of birth		
Foreign born	43.0 (49/114)	0.65 (0.37–1.52)
US born	53.9 (14/26)	
Parent's years in US		
20 or born in US	47.5 (28/59)	1.15 (0.45–2.94)
< 20 & ≥ 10	43.3 (26/60)	0.97 (0.38–2.49)
< 10	44.0 (11/25)	1.00

CI confidence interval

[¥]$P < 0.05$

[a]Total n = 144 but categories do not always add up to 144 due to missing data or applicability of the question to the total population

Table 3

Adjusted logistic regression for risk of child obesity among 140 Latino children in San Francisco, Bay Area

Variable	Odds ratio (95% CI)
Speak Spanish at home	
Yes	2.97 (1.28–6.86)
No	1.00[a]
Breakfast (daily)	
Yes	0.34 (0.15–0.78)
No	1.00[a]
Pizza consumption	
1×/week	0.55 (0.26–1.19)
< 1×/week	1.00[a]
Parent obese (BMI 30)	
Yes	1.84 (0.86–3.90)
No	1.00
Torta consumption	
1×/month	0.45 (0.21–1.00)
< 1×/month	1.00[a]
Child sex	
Male	1.48 (0.70–3.12)
Female	1.00[a]
Age (continuous)	1.00 (0.70–1.41)

CI confidence interval

Fixed model including covariates that were significant at $P < 1.0$ in bivariate analysis and known risk factors for obesity

[a]Reference category