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Childhood obesity has risen dramatically during the last few decades and the factors associated with it vary for different ethnicities. The purpose of this study is to find ethnic differences in the distribution of factors associated with obesity in children. The data used in this study was collected in a school-based study of 1,076 school children in Fort Worth, Texas.

Obesity was found to be more prevalent in Hispanics and African Americans than in Caucasians. Reported factors associated with childhood obesity, that were more prevalent in Hispanics were: eating more sweets and less vegetables, not doing regular daily exercise and watching more TV. In African Americans children the more common correlates of obesity were: reported eating more sweets, fewer fruits, watching more TV, and not doing daily exercise. For Caucasians reported correlates of obesity were: eating more chips, and being less involved in active sports, when compared to African American and Hispanic children.

ETHNIC DIFFERENCES IN THE DISTRIBUTION OF FACTORS

ASSOCIATED WITH OBESITY IN CHILDREN

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CHAPTER I

INTRODUCTION

The prevalence of obesity in the United States has risen dramatically, in all ages, during the past few decades and it is still underdiagnosed and undertreated (Makdad et al., 1999; Moran, 1999). This growing epidemic is threatening the health of millions of Americans in the United States. Obesity may have life-long physical and emotional consequences. National Institute of Health has indicated, in the clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults, that many health problems including high blood pressure and type II diabetes mellitus are associated with obesity (1998). It is also directly related to all-cause mortality (Manson, Willett, & Stampfer, 1995).

Data from the National Health Interview Survey (NHIS) collected during January-June 2001 shows that 22.4% of U.S. adults aged 20 years and older were obese. The annual prevalence of obesity among U.S. adults increased slightly over time from 19.4% in 1997 to 20.6% in 1998, 21.5% in 1999, and 21.8% in 2000 (NHIS, 2002). The differences in age-adjusted prevalence of obesity among the three race/ethnicity groups were mainly seen in women. The age-adjusted prevalence of obesity was 36.0% in black non-Hispanic women, 25.6% in Hispanic women, and 20.2% in white non-Hispanic women (NHIS, 2002).

According to the latest report of US Surgeon General regarding the prevention and control of overweight/obesity, the prevalence of overweight and obesity is higher in

women who are members of racial and ethnic minority populations than in non-Hispanic white women (U.S. Department of Health and Human Services [DHHS], 2001). Among men, Mexican Americans have a higher prevalence of overweight and obesity than non-Hispanic whites or non-Hispanic blacks. For non-Hispanic men, the prevalence of overweight and obesity among whites is slightly greater than among blacks (DHHS, 2001).

Treatment of obesity in adults is notoriously difficult for patients and physicians alike, and it rarely meets with long-term success. Thus, prevention of obesity in childhood seems to be the best strategy for decreasing the prevalence of this condition (Moran, 1999). Obesity tends to "track" throughout life, meaning that its presence at any age will increase the risk of persistence at subsequent ages (Power, Lake, & Cole, 1997; Whitaker, Wright, & Pepe, 1997). Obese children are at increased risk of becoming obese adolescents, who are then very likely to remain obese as adults.

According to a report of Center for Disease Control and Prevention (CDC), the selected estimates from the National Health Interview Survey (NHIS) data from January-June 2001, the percentage of children and adolescents who are defined as overweight has more than doubled since the early 1970s (1999). Initial results from the 1999 National Health and Nutrition Examination Survey (NHANES), using measured heights and weights, indicate that an estimated 13 percent (4% in 1971-74) of children ages 6-11 years and 14 percent (6% in 1971-74) of adolescents ages 12-19 years are overweight (Figure 1). This represents a 2 to 3 percent increase from the overweight estimates of 11 percent obtained from NHANES III (1988-94) (CDC, 1999).

African Americans and Hispanics children have higher prevalence of obesity than other ethnicities, as seen in the 'Estimates from the 2000 and Early 2001 National Health Interview Surveys' report (NHIS, 2002). Among other risk factors some socioeconomic, cultural, and behavioral risk factors are also associated with this problem.

Racial and ethnic disparities in overweight appear to occur in children and adolescents. Data for youth from NHANES III showed a similar pattern to that seen among adults. Mexican American boys tended to have a higher prevalence of overweight than non-Hispanic black and non-Hispanic white boys. Non-Hispanic black girls tended to have a higher prevalence of overweight compared to non-Hispanic white and Mexican American girls (DHHS, 2001). The National Heart, Lung, and Blood Institute Growth and Health Study on overweight in children found a higher mean BMI for black girls aged 9 and 10 years, compared to white girls of the same ages. This racial difference in BMI widened and was even greater at age 19 (DHHS, 2001).

The rapid increase in childhood obesity has led to increased concern over the diets and lifestyle of American children. Increasing fruit and vegetable intake and decreasing fat and sugar intake significantly helps decreasing obesity in parents and their children (Epstein, Gordy, & Raynor, 2001). Increased physical activity in children is associated with significant decrease in percent overweight and body fat (Epstein, Paluch, & Gordy, 2000). It has been suggested that television viewing, as part of a sedentary lifestyle, is one of the most easily modifiable risk factors of obesity among children (Robinson, 1998). Reducing television, videotape, and videogame use has been shown to be promising population based approach to prevent childhood obesity (Robinson, 1999).

Several studies have reported an increase in childhood obesity, as well as higher rates of obesity in Hispanic and African American children (Deckelbaum & Williams, 2001; Makdad et al., 1999; Arroyo et al., 2000; DHHS, 2001). However very limited information is available regarding the different correlates of obesity in children of different ethnic subgroups in USA.

As discussed above Hispanic and African American children are at higher risk for overweight and obesity. In addition, obesity is a risk factor for the development of chronic diseases such as type II diabetes mellitus (T2DM) and cardiovascular diseases (CVD). The purpose of this study was to find ethnic differences in the distribution of factors associated with obesity in children.

CHAPTER II

RESEARCH AND DESIGN METHODOLOGY

This is a cross-sectional study that used the data collected in a school-based study of 1,076 school children in Fort Worth, Texas. The original study was conducted in the spring of 2000, by the University of North Texas Health Science Center School of Public Health, in collaboration with the Fort Worth Independent School District (FWISD), the City of Fort Worth Public Health Department, and Cook Children's Hospital. Seventeen FWISD schools were included in the study. Schools were selected following a non-probabilistic sampling procedure that yielded a sample population with a similar distribution of the overall school district's demographic and geographical profile.

All fifth grade students at the selected elementary schools were invited to participate in the assessment. The school nurse sent a package that included a letter of invitation describing the project, informed consent forms, and a questionnaire to the parent or guardian of each child. The questionnaire included questions about child demographics, family history of diabetes, and lifestyle, i.e. nutritional and physical activity practices. At the time of data collection study personnel explained the study procedures and measurements and the fact that participation was voluntary for children whose parent or guardian had returned the signed consent form. If the child agreed to participate he/she was asked to sign the child ascent form. Of a total of 1,500 fifth graders, 1,076 (71.7%) participated. All fifth graders who met the consent and study requirements (1,018) were studied. In this study, only African American, Caucasian, and

Hispanic children were included because the sample size for other ethnicities was very small (4.4%). In addition to demographic information, eating and physical activity practices, and family history of diabetes mellitus, the child assessment included height, weight, blood pressure (BP), and acanthosis nigricans.

Overweight/Obesity:

Weight was measured in pounds using a digital electronic weighing scale (Tanita Model TBF-300) with the child wearing light clothes and no shoes. Height was measured in inches to the nearest 1/16 of an inch using a portable stadiometer attached to the wall. Measurements were made with the child standing without shoes. Body Mass Index (BMI) was calculated as weight in kilograms divided by the square of the height in meters.

Children with a BMI value between the 85th and 94.99th percentiles for age and gender were classified as overweight, and those with a BMI greater than or equal to the 95th percentile as obese (Barlow & Dietz, 1998; Himes & Dietz, 1994). In the present study, unless otherwise indicated, the terms overweight and obesity are used interchangeably, as suggested by Troiano and Flegal (1998).

Blood Pressure:

Blood Pressure was measured on the right arm with the appropriate cuff size after the child rested for at least 15 minutes in a sitting position. An automated Dinamap 8100 XL monitor was used. BP in all children was measured twice with the same monitor by a trained and registered nurse from Cook Children's Hospital. If the readings were elevated for the child's age and height, a third reading was taken after the child rested for

20 minutes. The lower reading was recorded (Barker, Shiell, & Law, 2000; Myung, Menard, & Yan, 2001; Wattingny, Webber, Lawrence, & Berenson, 1996).

Blood pressure (BP) was classified using the guidelines from the "Update on the 1987 Task Force Report on High Blood Pressure in Children and Adolescents" (National High Blood Pressure Education Program Report, 1996). According to the task force, high blood pressure or hypertension in children is defined by systolic blood pressure equal to or greater than the 95th percentile for age, sex, and height.

Physical Activity and Diet:

The measurement of daily hours/minutes of physical activity (playing, exercise, sports), watching television, and number of daily servings of snacks, sugar sweetened drinks, fruits, and vegetables, were based on children's and parents' self report.

All the variables of interest (correlates of obesity) were dichotomized using cut-off points based on percentiles or standard definitions. Children with BMI within the 85^{th} to the 94.99^{th} percentiles were classified as Overweight/Obese, and children with BMI under 85^{th} percentile as Non-obese. Blood pressure was dichotomized into high or normal based on 95^{th} percentile for the age, sex, and height of the child, as defined earlier (National High Blood Pressure Education Program Report, 1996). Reported consumption of chips or sweets was divided into two levels, eating equal to or more than three servings per week or eating less than three servings per week. Vegetable and fruit consumption was dichotomized based on reported eating frequency; eating more than two times per day versus equal to or less than two times per day. 'Playing active games per day' was divided into reported playing more than two hours per day, versus equal to or less than

two hours per day. 'Watching TV' was also subdivided into two categories; watching television more than two hours, versus watching two or lesser hours per day. The reported 'Exercise at home' was given as 'Yes' or 'No', so no further categorization was needed for this variable.

CHAPTER III

STATISTICAL ANALYSIS

For the purpose of comparison of different ethnicities, the Caucasian group was used as a reference category. Hispanic and African American were compared with this group with respect to the study variables, i.e., obesity, blood pressure, eating chips, eating sweets, vegetable servings, fruit servings, exercise at home, active play per day, and watching TV per day. Crude odds ratio was used to determine associations between ethnicities and variables of interest (Szklo & Nieto, 2000). After the crude analysis, confounding effects and interactions were studied by using Mantel-Haenszel stratified analysis and the Breslow-Day test (Breslow & Day, 1980). The presence of interaction was identified during the stratified analysis. This was done by comparing and testing the homogeneity of the odds ratios among the different categories of the potential interacting variables. The adjusted analysis was also carried out by using multiple logistic regression to assess the association of each variable with ethnicity while adjusting for all potential confounders simultaneously (Rosner, 2000; Szklo & Nieto, 2000). Since the purpose of this study is to assess the effect of each variable individually, the adjusted analysis of interacting variables was carried out separately for each non-interacting stratum, using multiple logistic regression (Szklo & Nieto, 2000). Prediction of outcome with different combinations of factors was not intended in this study.

CHAPTER IV

RESULTS

Age, Gender and Ethnicity:

The majority of the 1,018 participants were 10, 11 and 12 years of age. However, four (0.4 %) were out of this range, one was eight, one was nine, and two, 13 years of age. As they did not constitute important outliers, all children were grouped in the same age group. A total of 525 (51.6%) of the children were female (Table 1). Hispanics 598 (56.1%) and African American 250 (23.5%) children were compared with Caucasians 170 (15.9%) for the different factors associated with overweight and obesity (Table 1).

The frequency and percentage of children for each study variable, subdivided into each non-interacting stratum, is described in Table 4, with their corresponding ethnicity.

Obesity:

The prevalence of overweight/obesity, in general, is higher in Hispanic (31.9%) and African American (32.8%) children as compared to Caucasian children (23.5%) (Table 2). The prevalence of obesity is slightly higher in our study population for African American and Caucasian females (18.4% and 11.6% respectively), and African American males (13.6%) as compared to NHANES III population (Troiano & Flegal, 1998) (Table 3).

The stratified analysis showed that the likelihood of obesity does not differ significantly in Hispanic children as compared to Caucasian children, if both groups report eating more chips (Odds Ratio [OR] = 0.96, 95% Confidence Interval [CI]: 0.55-

1.67). Among children who reported eating fewer chips, the likelihood of obesity is higher in Hispanic children (OR = 2.03, CI: 0.63-6.56). African American children are about two times more likely to be obese than Caucasian children, irrelevant of eating more or less servings of chips (OR = 1.88, CI: 1.01-3.47; and OR = 2.18, CI: 0.40-11.88, respectively) (Table 5).

In children who reported eating less than two servings of fruits per day, the association of obesity does not differ significantly in Hispanic and African American as compared to Caucasian children (OR = 0.74, CI: 0.42-1.32; and OR = 1.53, CI: 0.82-2.84, respectively). This association increased three fold in Hispanics (OR = 3.52, CI: 1.17-10.56) as compared to Caucasians, when they reported eating more than two servings of fruit per day. A suggested explanation for this finding could be that the types of fruits eaten by Hispanic children have higher carbohydrate content than those eaten by Caucasians, therefore eating more fruit would be contributing to higher obesity in Hispanics. A similar association is seen in African American children (OR = 2.85, CI: 0.47-17.33), however, this finding lacks of enough precision and chance cannot be ruled out as a likely explanation (p = 0.26) (Table 5).

In children with normal blood pressure the probability of being obese is almost the same in children of either ethnicity (African American, or Hispanic) as compared to Caucasian (OR = 0.95, CI: 0.55-1.64; and OR = 1.27, CI: 0.69-2.36, respectively). In children who have high blood pressure (BP $\geq 95^{th}$ percentile, as described above), African American children are seventeen times (OR = 17.02, CI: 2.11-137.50) more likely to be obese than Caucasians. A similar but non-significant association is seen in

Hispanic children (OR = 2.07, CI: 0.68-6.25). However, both associations lack precision (Table 5).

High Blood Pressure:

Obese Hispanic and African American children are about three times more likely to have high blood pressure (OR = 2.78, CI: 1.06-7.31; and OR = 3.18, CI: 1.06-9.49) than obese Caucasian children. In non-obese Hispanic children, blood pressure does not differ significantly from that of Caucasian children (OR = 1.46, CI: 0.71-3.00). However, in non-obese African American children, high blood pressure seems to be 70% less likely than in non-obese Caucasian children (OR = 0.30, CI: 0.09-1.03). However, this finding was not statistically significant (p = 0.06) (Table 5).

Blood pressure does not differ significantly in Hispanic or African American children, among those who reported less hours of active games, as compared to those of Caucasian (OR = 1.36, CI: 0.72-2.55; and OR = 0.62, CI: 0.26-1.49, respectively). Among children who reported more hours of active games, Hispanic children are about six times more likely to have high blood pressure than Caucasian children (OR = 5.82, CI: 1.19-28.47). African Americans also show a similar relationship (OR = 4.06, CI: 0.79-20.91) (Table 5).

Eating Chips:

In non-obese Hispanic or African American children, the reported frequency of eating chips does not differ significantly from that of Caucasian children (OR = 0.89, CI: 0.48-1.65; and OR = 1.22, CI: 0.53-2.79, respectively). In obese children, Hispanics and

African Americans seem to eat fewer servings of chips, than Caucasians (OR = 0.26, CI: 0.07-1.01; OR = 0.41, CI: 0.08-2.03, respectively) (Table 6).

Eating Sweets:

Hispanic and African American children, who reported watching more than two hours of TV per day, are about three times more likely to eat more sweets than their Caucasian counterparts (OR = 2.65, CI: 0.90-7.78; and OR = 3.02, CI: 0.94-9.73 respectively), while children of any ethnicity, who reported watching lesser hours of TV, are less likely to differ in their sweet eating habits (OR = 0.84, CI: 0.39-1.79; and OR = 0.73, CI: 0.27-2.03, for Hispanics and African Americans respectively). However, these associations were not statistically significant ($p > 0.05$) (Table 6).

Eating Vegetables:

Hispanic children are more likely to report eating less servings of vegetables than Caucasian children. This odds ratio is seen stronger among females than in males (OR = 2.21, CI: 1.10-4.42; and OR = 1.58, CI: 0.76-3.28 respectively). African American male children are more likely to report eating more servings of vegetables than Caucasian male children (OR = 0.40, CI: 0.18-0.92). A similar association is seen in females (OR = 0.61, CI: 0.27-1.36) (Table 6).

Hispanic children who do exercise are less likely to report eating vegetables compared to Caucasian children (OR = 2.28, CI: 1.32-3.94). Hispanic children who reported not to do exercise at home show an opposite trend (OR = 0.25, CI: 0.03-2.29), African American children are more likely to report eating more often vegetables than Caucasians, and a stronger association is seen if they do not exercise at home as

compared to those who exercise at home (OR = 0.07, CI: 0.01-1.00; and OR = 0.59, CI: 0.32-1.08, respectively) (Table 6).

Eating Fruit:

Hispanic children, in general, are more likely to report eating fruit than Caucasian children. This odds ratio is more relevant in obese children (OR = 0.14, CI: 0.04-0.48), as well as in children who watch more TV (OR = 0.10, CI: 0.03-0.32). Although African American children do not differ significantly from Caucasian children in their habit for eating fruit, African American eat less fruits than Caucasians if they are non-obese (OR = 1.50, CI: 0.69-3.26), or if they watch less TV (OR = 4.15, CI: 0.76-22.77). However, these associations were not statistically significant ($p > 0.05$) (Table 6).

Exercise at Home:

Hispanic and African American female children are more likely to report not doing exercise at home than Caucasian children (OR = 9.14, CI: 3.37-24.76; and OR = 10.69, CI: 3.30-34.56, respectively). This association was stronger among those children who reported eating more vegetables (OR = 26.31, CI: 3.27-211.78; OR = 16.49, CI: 1.88-144.53, for Hispanics and African Americans respectively) (Table 6). Hispanic and African American male children are about three times more likely to report not doing exercise than Caucasian male children (OR = 3.05, CI: 1.41-6.59; and OR = 2.56, CI: 1.01-6.48 respectively) (Table 6).

Active Play per Day:

Hispanic children with normal blood pressure do not differ significantly from Caucasian children in their reported active games playing hours per day (OR = 1.18, CI:

0.72-1.94). African American children with normal blood pressure reported playing more hours of active games than Caucasian children (OR = 0.56, CI: 0.32-0.97). Among those with high blood pressure, African American children reported spending more hours in playing active games than Caucasian children with high blood pressure (OR = 0.04, CI: 0.01-0.41). Hispanic children also show a similar trend (OR = 0.22, CI: 0.04-1.22) (Table 6).

Watching TV:

Among children who reported eating more sweets, Hispanic children are marginally and African American are significantly more likely to report watching more hours of TV than Caucasian children (OR = 1.53, CI: 0.94-2.48; OR = 2.63, CI: 1.51-4.57, respectively). Among children who reported eating more fruits, Hispanic and African American children are about four times (OR = 4.47, CI: 1.54-12.97) and about seventeen times (OR = 17.44, CI: 3.78-80.35) respectively, more likely to watch more TV than Caucasian children. Among children who eat less sweets and fruits, ethnic differences of reported hours of watching TV are irrelevant and not statistically significant ($p > 0.1$) (Table 6).

CHAPTER V

DISCUSSION

Several studies have indicated that childhood obesity is more prevalent in African American and Hispanic children as compared to Caucasians (Crawford et al., 2001; Park, Menard, & Schoolfield, 2001). Our findings are consistent with these findings. In our study sample Caucasians are less likely to be obese than both Hispanics and African Americans.

In previous studies, high correlation has been found between body mass index and high blood pressure. Rocchini et al., (1988) suggested that this may be due to elevated plasma insulin concentration and that hyperinsulinemia is directly related to blood pressure sensitivity to sodium intake (Rocchini et al., 1988). Our study also shows similar results. A stronger association between obesity and high BP, was seen in Hispanic and African American children as compared to Caucasians. High blood pressure was more likely in obese Hispanic and African American children than in obese Caucasians. In addition, Caucasians are less likely to have high blood pressure if they are more involved in active sports, as compared to Hispanics and African Americans.

Hispanic and African American obese children are less likely to eat chips than the Caucasian obese children. Therefore eating chips seems to play a more important role as a risk factor for obesity in Caucasian children than in Hispanic or African American children.

Ludwig, Peterson, and Gortmaker has described the positive association of sweet and sugar sweetened drinks with childhood obesity (2001). In our study, we found this

risk factor more likely to be reported among Hispanic and African American children, especially among those that reported watching more TV, as compared to Caucasians.

Eating more fruits and vegetables helps decreasing obesity and has been recommended for families with overweight or obese children (Epstein et al., 2001). We found that Hispanic children eat less vegetables and more fruits, and African American children eat more vegetables and equal or less fruits than the Caucasian children. Probably Hispanics are eating fruits with high carbohydrate level, like mango, which is also contributing to obesity in Hispanics. Therefore, for hispanic children, the fruits with lower carbohydrate levels should be recommended.

Hispanic and African American children were less likely to be involved in regular exercise at home, especially girls, who are 9 to 11 times less likely to do exercise as compared to Caucasian girls. These results are consistent with Anderson, et al., (1998), who has reported the lower rate of physical activity in African American and Hispanic girls (Andersen, Crespo, & Bartlett, 1998). According to Fogelholm et al., (1999), parent inactivity is a strong and positive predictor of child inactivity (Fogelholm, Nuutinen, & Pasanen, 1999). Therefore, Hispanic and African American families should encourage their children to involve in these activities. Hispanic and African American children are equal or more likely to be involved in playing active games every day than Caucasians, which is also a healthy behavior.

Higher caloric intake, and more time with TV/video games are being described as risk factors for childhood obesity in both genders (Berkey et al., 2000). Other epidemiological studies have also shown that television watching, and sedentary

behaviors associated with it, are risk factors for the development of obesity in children (Epstein, Paluch, & Gordy, 2000). In the present study, we found an association of such sedentary behaviors as eating more sweets and fruits more likely in those of Hispanic and African American children who are also more likely to watch more TV, as compared to Caucasians.

CHAPTER VI

CONCLUSIONS

Childhood obesity was found to be more prevalent in Hispanics and African Americans than in Caucasians. Obese children of Hispanic and African American origin were also at higher risk of having high blood pressure than Caucasian children.

Sweets and sugar-sweetened drinks were more likely to be a risk factor for childhood obesity in Hispanics and African Americans. Hispanic children eat fewer vegetables, and African Americans eat fewer fruits than Caucasians. A regular daily exercise was seen less likely in Hispanic and African American children than in Caucasians. Watching TV and playing video games are much more common in African American children, followed by Hispanics, compared to Caucasians.

Studies of ethnic differences may be strongly influenced by social and economical variables. The original study was not designed to evaluate socioeconomic status, therefore, we were unable to control for socioeconomic variables in the analysis.

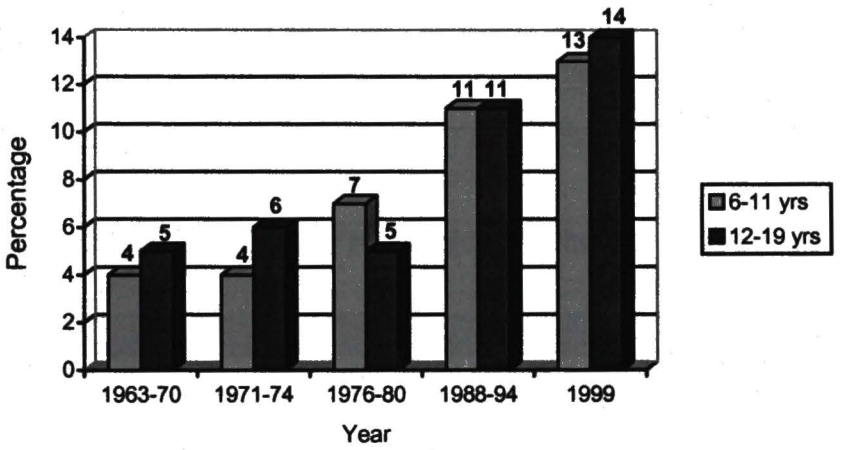
The distribution of factors associated with childhood obesity, found more prevalent in Hispanics were: eating more sweets and less vegetables, not doing regular daily exercise and watching more TV, as compared to Caucasians. The factors more common in African Americans children, as compared to Caucasians, were: eating more sweets and fewer fruits, watching more TV, and not doing daily exercise. The correlates of obesity seen more in Caucasians were: eating more chips, and being less involved in active sports, when compared to African American and Hispanic children.

Awareness of these risk factors and the importance of healthy behaviors such as eating more fruits and vegetables, watching less TV, and doing daily exercise should be emphasized in interventions or educational programs. The knowledge of ethnic differences regarding these risk factors will help design better-targeted approaches to control childhood obesity.

FIGURE

Figure 1:

Prevalence of Overweight Among Children and Adolescents Ages 6-19 Years (CDC, 1999)



NOTES: Excludes pregnant women starting with 1971-1974. Pregnancy status not available for 1963-65 and 1966-70.
Data for 1963-65 are for children 6-11 years of age; data for 1966-70 are for adolescents 12-17 years of age, not 12-19 years.

TABLES

Table 1: Distribution of Ethnicity and Gender. Ethnicity and Risk Factors for Obesity in Children.

Gender	Ethnicity			
	Hispanic	**African American**	**Caucasian**	**Total**
Female	314 (52.5%)	125 (50.0%)	86 (50.6%)	525 (51.6%)
Male	284 (47.5%)	125 (50.0%)	84 (49.4%)	493 (48.4%)
Total	598	250	170	1018

Table 2: Distribution of Obesity by Ethnicity. Ethnicity and Risk Factors for Obesity in Children.

Obesity	Ethnicity			
	Hispanic	**African American**	**Caucasian**	**Total**
Overweight/Obese	191 (31.9%)	82 (32.8%)	40 (23.5%)	313 (30.7%)
Non-obese	407 (68.1%)	168 (67.2%)	130 (76.5%)	705 (69.3%)
Total	598	250	170	1018

Table 3: Comparison of the Prevalence of Obesity (BMI $\geq$ 95%) in NHANES III (1988-1994) Population and the Present Study Population. Ethnicity and Risk Factors for Obesity in Children.

Gender	Ethnicity	NHANES III* Age 6-11	NHANES III* Age 12-17	This Study** Age 10-12
Female	Hispanic	14.3%	13.7%	13.1 %
	African American	16.4%	15.7%	18.4%
	Caucasian	9.2%	8.5%	11.6%
Male	Hispanic	17.4%	14.6%	18.3%
	African American	11.9%	10.7%	13.6%
	Caucasian	10.3%	11.1%	10.7%

* Unadjusted Prevalence of obese for NHANES III, from Sex and Age-specific 95th Percentile Cutoff Points of Revised NCHS/CDC Growth Charts.

** The data shows only obese children with BMI $\geq$ 95 percentile.

Table 4: Stratified Frequency Distribution and Percentages for all Study Variables. Ethnicity and Risk Factors for Obesity in Children.

			Hispanic (%)	African American (%)	Caucasian (%)
Obesity	Chips ≥ 3 per week	Obese	133 (31.7)	72 (34.8)	34 (26.2)
		Non obese	286 (68.3)	135 (65.2)	96 (73.8)
	Chips < 3 per week	Obese	56 (33.5)	9 (25.0)	5 (13.9)
		Non obese	111 (66.5)	27 (75.0)	31 (86.1)
	Fruit ≤ 2 per day	Obese	99 (29.6)	63 (34.1)	32 (25.6)
		Non obese	236 (70.4)	122 (65.9)	93 (74.4)
	Fruit > 2 per day	Obese	69 (34.3)	16 (36.4)	6 (15.0)
		Non obese	132 (65.7)	28 (63.9)	34 (85.0)
	BP ≥ 95%	Obese	81 (57.4)	30 (69.8)	9 (34.6)
		Non obese	60 (42.6)	13 (30.2)	17 (65.4)
	BP < 95%	Obese	110 (24.1)	52 (25.1)	31 (21.5)
		Non obese	347 (75.9)	155 (74.9)	113 (78.5)
Blood Pressure	Obese	BP ≥ 95%	81 (42.4)	30 (36.6)	9 (22.5)
		BP < 95%	110 (57.6)	52 (63.4)	31 (77.5)
	Non obese	BP ≥ 95%	60 (14.7)	13 (7.7)	17 (13.1)
		BP < 95%	347 (85.3)	155 (92.3)	113 (86.9)
	Active play ≤ 2 hr	BP ≥ 95%	98 (24.3)	19 (15.6)	24 (20.5)
		BP < 95%	305 (75.7)	103 (84.4)	93 (79.5)
	Active play > 2 hr	BP ≥ 95%	32 (21.9)	22 (19.5)	2 (4.0)
		BP < 95%	114 (78.1)	91 (80.5)	48 (96.0)
Eating Chips	Obese	Chips ≥ 3 per week	133 (70.4)	72 (88.9)	34 (87.2)
		Chips < 3 per week	56 (29.6)	9 (11.1)	5 (12.87)
	Non obese	Chips ≥ 3 per week	286 (72.0)	135 (83.3)	96 (75.6)
		Chips < 3 per week	111 (28.0)	27 (16.7)	31 (24.4)
Eating Sweets	TV > 2 hr	Sweets ≥ 3 per week	226 (90.4)	125 (86.8)	46 (80.7)
		Sweets < 3 per week	24 (9.6)	19 (13.2)	11 (19.3)
	TV ≤ 2 hr	Sweets ≥ 3 per week	245 (76.3)	76 (85.4)	88 (82.2)
		Sweets < 3 per week	76 (23.7)	13 (14.6)	19 (17.8)
Vegetable servings per day	Female	Veg ≤ 2 servings/d*	206 (73.6)	73 (62.9)	52 (61.9)
		Veg > 2 servings/d	74 (26.4)	43 (37.1)	32 (38.1)
	Male	Veg ≤ 2 servings/d	191 (79.6)	64 (58.7)	61 (72.6)
		Veg > 2 servings/d	49 (20.4)	45 (41.3)	23 (27.4)
	No Ex at Home	Veg ≤ 2 servings/d	118 (74.7)	37 (64.9)	17 (89.5)
		Veg > 2 servings/d	40 (25.3)	20 (35.1)	2 (10.5)
	Ex at Home	Veg ≤ 2 servings/d	214 (75.9)	76 (55.5)	92 (63.9)
		Veg > 2 servings/d	68 (24.1)	61 (44.5)	52 (36.1)

Table 4 (Cont.)

			Hispanic (%)	African American (%)	Caucasian (%)
Fruit servings per day	Obese	Fruit ≤ 2 servings/d	99 (58.9)	63 (79.7)	32 (84.2)
		Fruit > 2 servings/d	69 (41.1)	16 (20.3)	6 (15.8)
	Non obese	Fruit ≤ 2 servings/d	236 (64.1)	122 (81.3)	93 (73.2)
		Fruit > 2 servings/d	132 (35.9)	28 (18.7)	34 (26.8)
	TV > 2 hr	Fruit ≤ 2 servings/d	134 (60.1)	107 (78.7)	48 (82.8)
		Fruit > 2 servings/d	89 (39.9)	29 (21.3)	10 (17.2)
	TV ≤ 2 hr	Fruit ≤ 2 servings/d	194 (64.0)	71 (82.6)	76 (71.7)
		Fruit > 2 servings/d	109 (36.0)	15 (17.4)	30 (28.3)
Exercise at Home	Female	No Ex at Home**	105 (40.7)	33 (31.4)	7 (8.6)
		Ex at Home	153 (59.3)	72 (68.6)	74 (91.4)
	Male	No Ex at Home	72 (30.5)	28 (26.7)	12 (14.6)
		Ex at Home	164 (69.5)	77 (73.3)	70 (85.4)
	Veg ≤ 2	No Ex at Home	118 (35.5)	37 (32.7)	17 (15.6)
		Ex at Home	214 (64.5)	76 (67.3)	92 (84.4)
	Veg > 2	No Ex at Home	40 (37.0)	20 (24.7)	2 (3.7)
		Ex at Home	68 (63.0)	61 (75.3)	52 (96.3)
Active Play per Day	BP ≥ 95%	Active play ≤ 2 hr	98 (75.4)	19 (46.3)	24 (92.3)
		Active play > 2 hr	32 (24.6)	22 (53.7)	2 (7.7)
	BP < 95%	Active play ≤ 2 hr	305 (72.8)	103 (53.1)	93 (66.0)
		Active play > 2 hr	114 (27.2)	91 (46.9)	48 (34.0)
Watching TV	Sweets ≥ 3	TV > 2 hr per day	226 (48.0)	125 (62.2)	46 (34.3)
		TV ≤ 2 hr per day	245 (52.0)	76 (37.8)	88 (65.7)
	Sweets < 3	TV > 2 hr per day	24 (24.0)	19 (59.4)	11 (36.7)
		TV ≤ 2 hr per day	76 (76.0)	13 (40.6)	19 (63.3)
	Fruit ≤ 2	TV > 2 hr per day	134 (40.9)	107 (60.1)	48 (38.7)
		TV ≤ 2 hr per day	194 (59.1)	71 (39.9)	76 (61.3)
	Fruit > 2	TV > 2 hr per day	89 (44.9)	29 (65.9)	10 (25.0)
		TV ≤ 2 hr per day	109 (55.1)	15 (34.1)	30 (75.0)

* d : day
** Ex: Exercise

Table 5: Crude and Adjusted Associations of Ethnicity with Obesity or High Blood Pressure. Ethnicity and Risk Factors for Obesity in Children.

		ODDS RATIO (OR)			
		Hispanic / Caucasian		African American / Caucasian	
		Crude OR (CI)	Adjusted OR* (CI)	Crude OR (CI)	Adjusted OR* (CI)
Obesity Yes / No	Chips ≥ 3 per week	1.31 (0.84-2.04)	0.96 (0.55-1.67)	1.51 (0.93-2.45)	1.88 (1.01-3.47)
	Chips < 3 per week	3.13 (1.15-8.48)	2.03 (0.63-6.56)	2.07 (0.62-6.92)	2.18 (0.40-11.88)
	Fruit ≤ 2 per day	1.22 (0.77-1.94)	0.74 (0.42-1.32)	1.50 (0.91-2.48)	1.53 (0.82-2.84)
	Fruit > 2 per day	2.96 (1.19-7.40)	3.52 (1.17-10.56)	3.24 (1.12-9.38)	2.85 (0.47-17.33)
	BP ≥ 95%	2.55 (1.06-6.11)	2.07 (0.68-6.25)	4.36 (1.55-12.30)	17.02 (2.11-137.50)
	BP < 95%	1.16 (0.74-1.82)	0.95 (0.55-1.64)	1.22 (0.74-2.03)	1.27 (0.69-2.36)
Blood Pressure ≥ 95% / < 95%	Obese	2.54 (1.15-5.62)	2.78 (1.06-7.31)	1.99 (0.84-4.73)	3.18 (1.06-9.49)
	Non obese	1.15 (0.64-2.05)	1.46 (0.71-3.00)	0.56 (0.26-1.19)	0.30 (0.09-1.03)
	Active play ≤ 2 hr	1.25 (0.75-2.06)	1.36 (0.72-2.55)	0.72 (0.37-1.39)	0.62 (0.26-1.49)
	Active play > 2 hr	6.74 (1.55-29.24)	5.82 (1.19-28.47)	5.80 (1.31-25.72)	4.06 (0.79-20.91)

* OR Adjusted for obesity, blood pressure, eating chips, eating sweets, vegetables servings, fruit servings, exercise at home, active play per day, and/or watching TV.

Table 6: Crude and Adjusted Associations for Ethnicity with Diet and Physical Activity Parameters. Ethnicity and Risk Factors for Obesity in Children.

		ODDS RATIO (OR)			
		Hispanic / Caucasian		African American / Caucasian	
		Crude OR (CI)	Adjusted OR* (CI)	Crude OR (CI)	Adjusted OR* (CI)
EatingChips ≥ 3 times per week/ < 3 times per week	Obese	0.35 (0.13-0.94)	0.26 (0.07-1.01)	1.18 (0.37-3.78)	0.41 (0.08-2.03)
	Non obese	0.83 (0.53-1.32)	0.89 (0.48-1.65)	1.62 (0.91-2.88)	1.22 (0.53-2.79)
Eating Sweets ≥ 3 times per week/ < 3 times per week	TV > 2 hr	2.25 (1.03-4.92)	2.65 (0.90-7.78)	1.57 (0.70-3.56)	3.02 (0.94-9.73)
	TV ≤ 2 hr	0.70 (0.40-1.22)	0.84 (0.39-1.79)	1.26 (0.59-2.72)	0.73 (0.27-2.03)
Vegetable servings ≤ 2 per day/ > 2 per day	Female	1.71 (1.02-2.87)	2.21 (1.10-4.42)	1.05 (0.59-1.87)	0.61 (0.27-1.36)
	Male	1.47 (0.83-2.61)	1.58 (0.76-3.28)	0.54 (0.29-0.99)	0.40 (0.18-0.92)
	No Ex at Hom	0.35 (0.08-1.57)	0.25 (0.03-2.29)	0.22 (0.05-1.04)	0.07 (0.01-1.00)
	Ex at Home	1.78 (1.15-2.75)	2.28 (1.32-3.94)	0.70 (0.44-1.14)	0.59 (0.32-1.08)
Fruits servings ≤ 2 per day/ > 2 per day	Obese	0.27 (0.11-0.68)	0.14 (0.04-0.48)	0.74 (0.26-2.07)	0.80 (0.18-3.63)
	Non obese	0.65 (0.42-1.02)	0.60 (0.34-1.06)	1.59 (0.90-2.81)	1.50 (0.69-3.26)
	TV > 2 hr	0.31 (0.15-0.65)	0.10 (0.03-0.32)	0.77 (0.35-1.70)	1.96 (0.11-33.60)
	TV ≤ 2 hr	0.70 (0.43-1.14)	0.73 (0.40-1.32)	1.87 (0.93-3.76)	4.15 (0.76-22.77)
Exercise at Home No/Yes	Female	7.26 (3.22-16.37)	9.14 (3.37-24.76)	4.85 (2.01-11.66)	10.69 (3.30-34.56)
	Male	2.56 (1.31-5.02)	3.05 (1.41-6.59)	2.12 (1.00-4.49)	2.56 (1.01-6.48)
	Veg ≤ 2	2.98 (1.70-5.25)	3.58 (1.88-6.83)	2.64 (1.38-5.05)	3.98 (1.81-8.74)
	Veg > 2	15.29 (3.53-66.21)	26.31 (3.27-211.78)	8.53 (1.90-38.20)	16.49 (1.88-144.53)
Active Play per day ≤ 2 hr / > 2 hr	BP ≥ 95%	0.26 (0.06-1.14)	0.22 (0.04-1.22)	0.07 (0.02-0.35)	0.04 (0.01-0.41)
	BP < 95%	1.38 (0.92-2.08)	1.18 (0.72-1.94)	0.58 (0.37-0.92)	0.56 (0.32-0.97)
Watching TV per day > 2 hr / ≤ 2 hr	Sweets ≥ 3	1.77 (1.18-2.63)	1.53 (0.94-2.48)	3.15 (1.99-4.97)	2.63 (1.51-4.57)
	Sweets < 3	0.55 (0.23-1.31)	0.55 (0.19-1.62)	2.52 (0.91-7.03)	1.26 (0.35-4.63)
	Fruit ≤ 2	1.09 (0.72-1.67)	0.96 (0.58-1.59)	2.39 (1.49-3.82)	1.58 (0.91-2.75)
	Fruit > 2	2.45 (1.14-5.28)	4.47 (1.54-12.97)	5.80 (2.25-14.98)	17.44 (3.78-80.35)

* OR Adjusted for obesity, blood pressure, eating chips, eating sweets, vegetables servings, fruit servings, exercise at home, active play per day, and/or watching TV.

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