Blood Pressure among Mexican-American, Cuban-American, and Mainland Puerto Rican Children

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SYNOPSIS

LITTLE IS KNOWN ABOUT BLOOD PRESSURE LEVELS and the extent of high blood pressure in Hispanic children and adolescents, especially in groups other than Mexican Americans. The authors of this study investigated the levels of systolic blood pressure (SBP) and diastolic blood pressure (DBP) and the extent of high blood pressure among Mexican-American, Cuban-American, and mainland Puerto Rican children and adolescents who participated in the Hispanic Health and Nutrition Examination Survey (HHANES).

Very few children and adolescents in these three Hispanic groups had high normal or high blood pressure. Puerto Rican children had significantly lower DBP than Mexican-American (2.4 mmHg) and Cuban-American (1.8 mmHg) children. Their SBP was also lower (1.7 mmHg) than that of Cuban-American children. These findings should be interpreted cautiously, however, since a significant observer effect was also found in this study.

Correlates of blood pressure in children in all three Hispanic groups were consistent with those found in studies of other ethnic groups. Age, body mass index, and pulse rate were significant predictors of both SBP and DBP (P less than 0.05). Gender was an important predictor of SBP but not DBP. Socioeconomic and cultural factors were not significant predictors of blood pressure in these Hispanic groups.

The prevalence of high blood pressure is lower among Hispanic adults compared to non-Hispanic adults *(1)*, but little is known about blood pressure levels in Hispanic children and adolescents. Blood pressure (BP) levels in Mexican-American children in Texas were very similar to levels among white and black children *(2)*; however, no data are available for children in other Hispanic groups.

We investigated the levels of systolic blood pressure (SBP) and diastolic blood pressure (DBP) and the extent of high blood pressure among children and adolescents in three Hispanic groups—Mexican Americans, Cuban Americans, and mainland Puerto Ricans—who participated in the Hispanic Health and Nutrition Examination Survey (HHANES). We also examined correlates of SBP and DBP to determine if they were similar to correlates reported for other ethnic groups.

Methods

The HHANES, conducted by the National Center for Health Statistics (NCHS) between 1982 and 1984, sampled civilian, noninstitutionalized Mexican Americans residing in five southwestern states (Arizona, California, Colorado, New Mexico, and Texas); Cuban Americans living in Dade County, Florida; and Puerto Ricans residing in the New York City area *(3)*. Centrally trained physicians took two blood pressure measurements 5 minutes apart on seated participants *(4)*. They measured systolic (first phase) and diastolic (fifth phase) blood pressure to the nearest even digit, using a standard mercury sphygmomanometer. The averages of the two measurements for SBP and DBP were used in all analyses.

Participants were excluded from analyses if they were not of the targeted ethnic group within selected households in each of the three areas in HHANES. The analytic samples consisted of 2281 Mexican-American, 282 Cuban-American, and 873 Puerto Rican children ages 6 to 17. Because the Cuban-American sample was small, some age-sex groups had very few participants.

Analyses included calculation of 1) age-specific (6 to 9, 10 to 12, 13 to 15 and 16 to 17 years) and gender-specific mean SBP and DBP stratified by Hispanic group, using sample weights computed by NCHS *(4)* so that estimates were representative of the targeted U.S. subpopulation in 1983, and 2) least squares regression analysis to test differences in SBP and DBP among the three groups (the weights were used from each of the three independent samples). Software was used to correct the standard errors of all estimates for the complex sampling design *(5)*.

Results

Mexican-American and Cuban-American children had significantly higher SBP and DBP than Puerto Rican children after adjusting for age, sex, body mass index (BMI), and pulse rate ($P<0.05$). However, we also found a significant observer effect, and because of this, comparisons among Hispanic groups must be interpreted cautiously. The observer effect accounted for the differences between Mexican Americans and Puerto Ricans in SBP but not DBP; DBPs were 2.4 mmHg higher among Mexican Americans. The differences between Cuban-American and Puerto Rican children also remained significant—SBP was 1.7 mmHg higher and DBP was 1.8 mmHg higher among Cuban Americans.

SBP differed by age and gender, and the interaction between the two was statistically significant ($P<0.05$) within each of the Hispanic groups. In the younger age groups, there was little difference in mean SBP by gender (Table 1). In the oldest age group, however, males had mean SBPs that were 8 to 10 mmHg higher than females. For males in each group, mean SBP continuously increased with increasing age group. Although mean SBP among females also increased with increasing age group,

Table 1. Mean systolic blood pressure and 95% confidence intervals, in mmHg, by gender, age, and Hispanic group (HHANES, 1982 to 1984)

Sex	Age	Mexican American		Cuban American		Puerto Rican	
		Mean	95% CI	Mean	95% CI	Mean	95% CI
Males	6–9	98.3	97.3–99.3	96.2	91.9–100.5	97.8	96.0–99.6
	10–12	104.4	103.0–105.8	104.1	100.6–107.6	102.0	100.4–103.6
	13–15	109.8	108.2–111.4	107.6	105.0–110.1	107.4	105.0–109.8
	16–17	114.1	111.4–116.5	112.5	108.8–115.1	113.5	112.2–115.8
Females	6–9	96.9	95.7–98.1	99.3	96.9–101.6	95.3	94.1–96.5
	10–12	104.2	103.0–105.4	104.7	102.5–106.8	100.0	98.6–101.4
	13–15	106.5	105.3–107.7	102.6	100.4–104.8	103.4	101.6–105.2
	16–17	106.9	105.4–108.6	102.6	100.1–105.9	103.7	102.2–105.8

Table 2. Mean diastolic blood pressure and 95% confidence intervals, in mmHg, by gender, age, and Hispanic group (HHANES, 1982 to 1984)

Sex	Age	Mexican American		Cuban American		Puerto Rican	
		Mean	95% CI	Mean	95% CI	Mean	95% CI
Males	6–9	59.7	58.9–60.5	62.0	59.0–64.9	55.9	54.3–57.5
	10–12	64.6	63.4–65.8	61.6	58.1–65.1	62.4	61.2–63.6
	13–15	66.2	64.8–67.6	62.1	59.9–64.2	62.4	60.4–64.4
	16–17	68.7	66.7–70.7	68.5	64.4–72.6	63.9	61.4–66.4
Females	6–9	59.4	58.2–60.6	59.4	55.3–63.5	55.7	54.1–57.3
	10–12	63.6	62.0–65.2	64.2	60.5–67.9	60.6	59.8–61.4
	13–15	66.6	65.4–67.8	63.7	60.8–66.6	62.5	60.5–64.5
	16–17	66.6	65.2–68.0	63.5	61.1–65.8	62.7	61.3–64.1

the increase was generally smaller compared to males and was not continuous among Cuban-American girls.

DBP did not differ significantly by gender ($P<0.05$) and increased less by increasing age group than SBP (Table 2). The increase in mean DBP by age group was continuous among Mexican Americans but was smaller and less continuous among Cuban Americans and Puerto Ricans.

In addition to age and gender, the following factors were investigated in multivariate analyses as potential predictors of BP in each of the Hispanic groups: BMI, resting pulse rate, family income, language use during the interview for the family questionnaire, birthplace of the head of the family (whether outside or inside the mainland United States), and the highest grade attended by the head of the family. Age, male gender, the interaction of age and gender, and BMI were directly associated with SBP in all three groups ($P<0.05$). In addition, pulse rate was positively associated with SBP among Puerto Ricans ($P<0.05$). BMI and age were the only significant predictors of DBP in all three groups; gender and pulse rate were also positively associated with DBP among Cuban Americans and Mexican Americans ($P<0.05$).

Between 5% and 8% of boys in each Hispanic group had blood pressures above the 90th percentile cutpoints used to define high normal blood pressure in *The Fifth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (6)*. Fewer Puerto Rican (3%) and Mexican-American (5%) girls than boys had blood pressures above these cutpoints. Although the estimate for Cuban-American girls (8%) was higher than for girls in the other two groups and was similar to that of Cuban-American boys, the standard error of this estimate was quite large (4%) due to the small sample of Cuban-American girls.

Discussion

Very few Mexican-American, Cuban-American, and mainland Puerto Rican children and adolescents had high normal or high blood pressure. Both SBP and DBP levels in this study were generally similar to those reported among Mexican-American children in Texas *(2)*. Puerto Rican children had lower blood pressure levels than children in the other two Hispanic groups although this finding should be replicated in future studies because of the observer effect also found in this study.

Correlates of blood pressure in children in all three Hispanic groups were consistent with those found in studies of other ethnic groups. As in other studies, SBP was higher in adolescent boys than girls *(2,7)* and both SBP and DBP increased with increasing age *(2)*. Similarly, SBP and DBP increased with increasing BMI *(7–10)*. Increasing pulse rate was also positively associated with SBP and DBP *(8,10)* although not consistently across Hispanic groups in this study. Socioeconomic and cultural factors such as family income, language use, place of birth, and education of the head of the family, as defined in this study, were not significant predictors of blood pressure in these Hispanic children and adolescents.

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