Blood pressure in 15- to 16-year-old adolescents of different ethnic groups in two London schools

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Summary

A blood pressure screening survey was conducted in 357 students, aged 15-16 years, in 2 London schools. Males had higher systolic blood pressures than females, and white males had significantly higher mean systolic pressures than black males, but diastolic pressures were similar. There is no evidence in this survey that blacks have higher mean blood pressures than whites—rather the reverse. This and the difference in blood pressure between schools suggest environmental factors may be important determinants of blood pressure.

KEY WORDS: blood pressure, ethnic, children.

Introduction

Studies in the U.S.A. have found higher mean blood pressures in the black compared to the white adult population as well as higher mortality from hypertension-related diseases such as stroke (U.S. National Office of Vital Statistics, 1976). In the United Kingdom, available evidence suggests similar differences: mortality from hypertension and stroke in West Indian and African immigrants is substantially higher than in the native-born in England and Wales (Marmot, Adelstein and Balusu, 1981); Meade *et al.* (1978) found black factory employees had higher mean blood pressures than white employees, and the Whitehall Civil Service Study (Marmot and Rose, 1983) confirms these differences. These studies were all in adults. There has been speculation that levels of adult blood pressure are determined in childhood. A survey was therefore undertaken to see if ethnic differences in mean blood pressures were discernible in adolescent school children in London.

Methods

Fourth and fifth year students, aged 15-16 years,

were surveyed in 2 ethnically mixed London comprehensive schools, KDC and BHS. Subjects were given a self-administered questionnaire. After 5 min rest with subject seated, 2 measures of blood pressure (using diastolic phase five) were recorded with a random zero sphygmomanometer from the right arm by an observer trained and standardized in blood pressure measurements. There were 2 observers in the survey. The mean of the two readings was used for analysis. Pulse rate, height and weight were also recorded. The surveys in both schools were done under standardized conditions by the same observers.

Results

Three-hundred and fifty-seven adolescents were seen, an overall response rate of 87%. There were no significant differences in sex and ethnic distribution between responders and non-responders.

Males had higher systolic pressures than females (Table 1). White males had significantly higher mean systolic pressures than black males but diastolic pressures were similar. These differences were consistent between schools and observers. Black females had higher mean diastolic pressures than white females in one school. Systolic pressures were similar. Mean blood pressures were significantly different between schools, consistent for different sexes and ethnic groups (Table 2).

Systolic and diastolic pressures were significantly correlated with height and weight. Adjusting for these factors using regression techniques and analysis of variance abolished the diastolic pressure differences between the white and black females but not the differences in systolic pressure between white and black males, nor differences between schools or sexes. Blood pressure was not related to reported smoking or alcohol consumption.

BHS school, which had higher mean blood pressures than KDC, had a higher percentage of pupils

TABLE 1. Blood pressure (BP) (mmHg) by sex, ethnic group and school [mean (s.d.)]

Ethnic group	KDC School			BHS School		
	n	Systolic BP	Diastolic BP	n	Systolic BP	Diastolic BP
Males						
White	81	114.4 (13.6)*	64.2 (12.9)	19	119.3 (11.1)*	70.1 (10.1)
Black	38	108.2 (11.1)*	63.9 (11.1)	22	112.0 (16.9)*	72.5 (11.1)
Other	12	116.7 (18.0)	67.4 (10.6)	21	114.7 (12.6)	70.5 (8.4)
All	131	112.8 (13.6)†	64.4 (12.2)†	62	115.1 (14.0)†	71.1 (10.5)†
Females						
White	57	102.9 (13.8)	60.9 (9.8)*	20	112.9 (14.0)	72.8 (12.3)
Black	19	103.4 (9.0)	67.3 (11.9)*	39	110.1 (12.1)	71.6 (10.3)
Other	4	105.3 (3.9)	66.3 (7.9)	21	110.7 (13.3)	71.9 (8.7)
All	80	103.2 (12.4)†	62.7 (10.5)†	83	110.9 (12.8)†	71.9 (10.3)†

Student's *t*-test: **P*<0.05 between ethnic groups; †*P*<0.05 between schools.

TABLE 2. Pulse rate and weight by sex, ethnic group and school [mean (s.d.)]

Ethnic group	KDC School		BHS School	
	Pulse rate (min ⁻¹)	Weight (kg)	Pulse rate (min ⁻¹)	Weight (kg)
Males				
White	72.0 (10.3)	59.7 (9.8)	76.8 (12.6)	61.8 (11.7)
Black	72.6 (9.7)	60.5 (9.0)	70.9 (14.8)	64.2 (9.5)
Other	74.0 (11.7)	61.9 (11.6)	76.6 (8.9)	52.4 (10.0)
All	72.4 (10.2)	60.1 (9.7)	74.6 (12.5)	59.5 (11.4)
Females				
White	77.7 (14.6)	55.1 (10.3)	87.4 (16.7)	58.6 (10.4)
Black	72.9 (12.4)	58.1 (8.7)	81.9 (11.9)	59.6 (11.1)
Other	74.5 (7.5)	55.6 (14.4)	83.0 (12.9)	50.6 (10.9)
All	76.4 (13.9)	55.8 (10.1)	83.6 (13.9)	56.8 (11.4)

reporting paternal unemployment, single parent families and positive family history of hypertension. Pulse rates and weights were also higher in BHS. However, these factors did not appear from our data to account for the differences between schools.

Discussion

The finding that white boys have higher mean pressures than black boys was unexpected in view of higher pressures documented in adult blacks compared with whites. In cross-sectional studies, there are several possible explanations: blood pressure may change differently in different ethnic groups, blacks having a greater rise with age so that mean pressures later diverge. Alternatively, this generation of adolescents may continue to differ from the previous generation with respect to blood pressure. Longitudinal studies are needed to resolve this question. In the U.S.A., ethnic differences have been similarly less consistent in younger age groups (U.S. National Office of Vital Statistics, 1976) and some studies indicate that black-white differences are minimized if factors such as social class or area of residence are controlled for (Harburg *et al.*, 1973). Certainly, the

unexpected and unexplained differences between schools in our survey require further investigation.

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