

The Birmingham blood pressure school study

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Summary

Four-hundred and twenty-eight school leavers of 3 ethnic groups (white, black and Asian) were screened for blood pressure, resting pulse rate and general anthropometric characteristics. Asian pupils were both shorter and lighter than the other two groups whilst black males were heavier and taller. There was no significant difference in the mean systolic or diastolic blood pressure between the 3 groups, although the black pupils had a stronger family history of hypertension, particularly on the mother's side. These observations differ in some respects from other ethnic blood pressure studies and establish values for the local population.

KEY WORDS: blood pressure, children, blacks, whites, Asians.

Introduction

Systemic hypertension is a recognized risk factor in both coronary artery and cerebrovascular disease (Kannel and Dauber, 1972; Berenson, Foster and Frank, 1978). Several recent studies in children have shown a higher prevalence of raised blood pressure than previously recorded (Rames *et al.*, 1978; Muñoz, Muñoz and Zambrano, 1980). Epidemiological studies have repeatedly shown the adult black population

in America to have a higher prevalence of raised blood pressure and related complications (Comstock, 1957; McDonough, Garrison and Haines, 1964). The age when this difference becomes apparent is variable, but may be as early as the mid-teenage years (Zinner *et al.*, 1975; Londe *et al.*, 1977). Longitudinal studies on young populations have shown a tendency towards 'tracking', by which individual examinees tend to retain their rank within the distribution of blood pressure. However, it is not known whether later hypertension can be predicted by measuring blood pressure in children (Clarke *et al.*, 1978; Zinner *et al.*, 1975). As interventional studies have shown marked benefits in reducing hypertension-related complications in adults, this highlights the need for early detection of cases requiring treatment.

Materials and methods

School leavers from 4 senior schools in Birmingham were recruited for this study. The schools were visited before the screening sessions to explain the object and methods used for measurements. The parents were informed of the survey and were given the opportunity to express their views. Only 3 pupils were not examined because of objections from their parents. All the other pupils present on the days of screening were examined. The schools were selected to provide adequate numbers in each ethnic group and attempts were made to choose schools with comparable social backgrounds using 3 criteria. Two of these were the percentage of pupils

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entitled to free school meals and the father's occupation used as an index of social class. [The 5 class system was used and the unemployed (12%) were classified separately: 10.5% of the pupils were not aware of their father's occupation]. Most belonged to social class 5, irrespective of race or sex. Finally, a housing index was calculated based on the proportion of people to the number of bedrooms per household.

The presence of hypertension in other members of the family was sought, as was a past history of significant illness affecting the pupils themselves, particularly in relation to heart and kidney disease. Race was determined by observation, and the place of birth was recorded. Three white and two black pupils were born outside the United Kingdom compared with 38% of the Asian group.

The mean age, taken as the age at the last birthday, was similar in the 3 groups as shown in Table 1 which also classifies the study population according to race and sex.

TABLE 1. Demographic data of study population

	Whites	Black	Asian	Other
Mean age (years) (s.d.)	15.5 (1.5)	15.4 (1.2)	15.7 (0.8)	—
Male	68	50	76	2
Female	70	60	102	0

The height was measured in cm to the nearest 5 mm with the pupils shoeless, employing standard methods using a plane and square. The weight was measured to the nearest $\frac{1}{2}$ kg with the pupils wearing light clothes using a high specification spring balance which was calibrated before each session. The radial pulse rate was recorded twice, each over a period of 1 min and approximately 10 min apart. The blood pressure was also measured twice for each pupil. This was taken in the right arm with the pupils seated using a standard 12.5 cm cuff and a Hawksley random zero sphygmomanometer. Readings were made to the nearest mmHg. The systolic pressure corresponded to Korotkoff phase I and the diastolic to Phase V (disappearance of sounds). The present analysis is confined to the first blood pressure measurement.

Statistical analyses were made using chi square and Student's *t*-test as appropriate.

Results

Blood pressure measurement was carried out on 428 school leavers from the 3 ethnic groups; the social backgrounds of the groups were comparable. Apart from father's occupation, the other criteria used to grade social class were unreliable due to different traditional social habits among the 3 groups.

A positive family history of hypertension was obtained in 40% of the West Indian pupils. This compares with 15% for white and 17.6% for Asians, both of which are significantly lower than the former group ($P < 0.001$). When specifically asked about the individual members of the family affected, the maternal contribution appeared to influence the overall pattern; the father's involvement was much less marked.

There were significant differences in weight between the 3 groups and this applied to both sexes. The black pupils were heavier than the other 2 and the whites were heavier than the Asians. Black pupils tended to be taller than the 2 other groups. The Asian males were significantly shorter than their black counterparts ($P < 0.03$) and the Asian females were significantly shorter than both black and white females ($P < 0.001$). Asian pupils had significantly faster pulses than the other 2 groups ($P < 0.01$).

The blood pressures in the 3 groups were similar but the Asian pupils tended to have slightly lower pressures than the others. Table 2 shows the mean systolic and diastolic blood pressures according to race and sex. The second blood pressure reading showed a narrower range and generally a slightly lower reading for both systolic and diastolic pressures. Higher blood pressure (defined as systolic of 135 mmHg or more and a diastolic of 85 mmHg or more), was present in roughly the same frequency (23% among white pupils, 26% among black and 20% among the Asian pupils).

TABLE 2. Mean blood pressure (BP) and pulse rate classified by race and sex [mean (s.d.)]

	White	Black	Asian
Mean pulse rate (/min)	80.4	77.6	83.4
Systolic BP (mmHg)			
Male	122.5 (13.9)	121 (11.9)	117.8 (15.4)
Female	118 (13.8)	117 (12.2)	115.6 (11.8)
Diastolic BP (mmHg)			
Male	66.7 (11.3)	64.1 (13.5)	60.8 (12.4)
Female	65.7 (11.8)	66.9 (9.9)	63.8 (12.2)

Discussion

The anthropometric data from this study confirms the general impression that Asians are shorter and lighter than the other 2 groups. The blacks were significantly heavier than both the whites and Asians, and thus, independent of race, they should have had higher blood pressure values (Johnson *et al.*, 1975). Most of the white pupils were born in England and presumably so were their parents. On the other hand, although most of the black pupils were born in England, their parents were mostly born in the West

Indies and had emigrated to this country in the early 1960s. Bearing in mind the high prevalence of hypertension in the West Indies, the similarity of blood pressure amongst the pupils screened here suggests that dietary or environmental factors may be playing a part in this young generation. However, a significant genetic contribution cannot be excluded and this may manifest itself in later years.

The slower resting pulse rate in the black pupils may reflect the obvious athletic qualities of this group or might, for some unknown reason, be due to increased vagal tone. Alternatively, the higher pulse rate in Asians may reflect their reaction to the examination or diminished vagal tone.

This study showed that there is no difference in the distribution of blood pressure, the mean systolic or diastolic pressures, or the prevalence of high blood pressure among a representative group of school leavers from the three main ethnic groups in Birmingham. A repeat screening will be useful in the future to detect trends, tracking and the incidence of hypertension in these groups.

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