Blood pressure in black, white and Asian factory workers in Birmingham

J. K. CRUICKSHANK*
M.B., B.Sc., M.R.C.P.

L. T. BANNAN‡
M.B., B.Sc., M.R.C.P.I.

M. BEEVERS
S.R.N.

S. H. D. JACKSON†
M.B., M.R.C.P.

D. G. BEEVERS
M.D., F.R.C.P.

V. L. OSBOURNE
A.A.M.S.

University Department of Medicine, Dudley Road Hospital, Birmingham B18 7QH

Summary

A screening survey was conducted among factory workers, aged 15-64 years, in Birmingham, England to investigate ethnic differences in blood pressure. One-thousand and forty-nine subjects (784 men, 265 women) were screened, representing 79% of the eligible population.

Mean systolic and diastolic blood pressures generally did not differ between men of black West Indian ($n=173$), local white ($n=439$) or Asian ($n=172$) origin, when matched by 10-year age groups. Analysis of covariance using age as the covariate revealed that, overall, Asian men had significantly lower systolic but higher diastolic pressures than the other ethnic groups. The proportion of men arbitrarily defined as hypertensive (≥ 160 mmHg systolic or ≥ 95 diastolic or blood pressures below this figure whilst receiving antihypertensive therapy) was 26% of West Indians, 22% of whites and 17% of Asians, but these were not significantly different when age was accounted for.

Black West Indian women ($n=101$) did have higher diastolic pressure than white women ($n=164$), but this difference was dependent on body mass index. Overall, systolic pressures in women were not significantly different.

These findings differ from those consistently reported from the United States.

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

Introduction

Epidemiological studies in the United States have

Present address: *Central Middlesex Hospital, London; †St Bartholomew's Hospital, London; ‡Letterkenny General Hospital, Eire.

consistently reported higher blood pressures in blacks compared with whites (Comstock, 1957; Cassel, 1971; Stamler *et al.*, 1975). This greater prevalence of hypertension is reflected in higher mortality rates from hypertension-related disease including strokes. It is not known whether these higher blood pressures can be explained by environmental influences, including social class or diet, or whether they are caused by a genetic predisposition (Langford, 1981). There have been very few population studies in Britain which have compared the blood pressures of blacks and whites, and there is little data on people born in the Indian sub-continent. Marmot, Adelstein and Bulusu (1981) reported deaths due to hypertension in Britain to be commoner in Afro-Caribbean than in the European-born population, and Cruickshank *et al.* (1980) found excess strokes in blacks, but fewer heart attacks. By contrast, Asians had slightly more heart disease than whites (Pedoe *et al.*, 1975).

To investigate the problem further, an epidemiological screening unit was established to examine blood pressures and other cardiovascular risk factors in factory workers in Birmingham. This is part of a multifactorial screening study, and the present paper presents data on blood pressures only.

Methods

The management of a group of factories in Birmingham were asked to participate in a health survey of their employees. All factories were engaged in light industry but none had any known toxicological hazard associated with cardio-pulmonary disease. In co-operation with the personnel departments and Trade Unions, the entire workforce of each factory was invited to complete a short standardized general health questionnaire, and attended a brief medical examination. Those not attending were counted from

the factory payroll and the percent screened calculated.

The questionnaire included information on past and present cigarette and alcohol consumption, family and personal histories of vascular disease and drug therapy. Information was obtained on the country of birth, and type of occupation. The examination included measurement of height and weight (after removal of shoes or boots). The ethnic origin of the examinees was entered by the observers at the time of examination. People of obviously mixed descent who were difficult to classify as belonging to one ethnic group were screened but not included in this analysis. Only predominantly black (Caribbean), Asian (from Pakistan, India or Bangladesh) or white examinees were included. All but 2% of black and Asian subjects were born outside the United Kingdom. Blood pressure was measured in the right arm, half-way through and at the end of the questionnaire, using the random zero sphygmomanometer, with diastolic pressures taken at the fifth phase and with the subject seated. Sphygmomanometer cuffs were sized 12×23 cm; where necessary larger cuffs (15×34) were used when examining obese people. All the observers (the authors) were trained in use of the questionnaire and the sphygmomanometer. Only the first blood pressure measurements are considered in this report. Black employees who were not West Indian, and Asians not from the Indian subcontinent (mainly Yemeni arabs) are not included in this analysis, and as a total of only 20 Asian women were screened, this group is also

excluded. Statistical analysis was conducted using the SPSS computer program.

Results

A total of 1079 factory workers in the above groups were examined, representing 79% of the eligible workforce in 12 Birmingham factories. The proportion eligible but who refused screening was approximately 20% in each ethnic group. One-thousand and forty-nine subjects (784 men, 265 women), aged 16–64 years, are considered in this paper.

Numbers of subjects screened and the overall prevalence of hypertension in each age, sex and ethnic sub-group are shown in Table 1. In men, variations in prevalence of hypertension (greater or equal to 160 mmHg, systolic or 95 mmHg diastolic or levels below these figures on treatment) between ethnic groups by age are not significantly different ($\chi^2=1.13$). Too few older Asians (55+ years) were seen for direct comparison, but differences in hypertension prevalence up to 55 years are not significant (Blacks v. Asians, aged 16–54 years, $\chi^2=1.20$).

Among women, a total of 27% of West Indians are hypertensive compared with 16% of whites, ($\chi^2=5.43$, $P<0.05$). However, the older black group is small and if ages 15–54 years are pooled and hypertension prevalence compared, the ethnic difference becomes significant ($\chi^2=9.76$; $0.01>P>0.001$).

Mean systolic and diastolic blood pressures were similar among men in each ethnic group (Fig. 1). Only 14 black men, aged 25–34 years, were screened,

TABLE 1. The prevalence of high blood pressure (HBP) in 1049 Birmingham factory workers

		Age (years)					
		15-24	25-34	35-44	45-54	55-64	Total
Men (n = 784)							
Black	n	23	14	50	61	25	173
	HBP	1	3	11	15	13	43
	Norm. treated	(4.3)*	(21.4)	(22.0)	(27.9)	(52.0)	(26.0)
White	n	59	87	96	88	109	439
	HBP	3	9	11	18	50	91
	Norm. treated	(5.1)	(10.3)	(11.5)	(26.1)	(46.8)	(22.1)
Asian	n	33	67	35	32	5	172
	HBP	2	6	8	10	1	27
	Norm. treated	(6.1)	(9.0)	(25.7)	(34.4)	(20.0)	(16.9)
Women (n = 265)							
Black	n	11	18	28	37	7	101
	HBP	0	0	3	16	2	21
	Norm. treated	(0)	(0)	(14.3)	(56.8)	(42.9)	(27.7)
White	n	50	29	25	32	28	164
	HBP	1	1	1	9	13	25
	Norm. treated	(2.0)	(3.5)	(4.0)	(31.3)	(46.4)	(15.9)

*Figures in parentheses are percentages of total subjects (n) with BP > 160 mmHg systolic or > 95 mmHg diastolic (HBP) and/or below this level on treatment (Norm. treated) (WHO criteria).

but Asian men, aged 25–34 years, had lower systolic pressures and Asian men, aged 35–44 years, had higher diastolic pressures than either the black or white subjects. Analysis of covariance using age as the covariate showed that, overall, Asians had significantly *lower* systolic pressures than either black or white men [$F_{(1, 772)} = 4.65$; $P < 0.05$], but also *higher* diastolic pressures than the other ethnic groups [$F_{(1, 772)} = 4.2$; $P < 0.05$]. Pulse pressures among Asian men were smaller. From ages 25 to 54 years, black women had consistently higher systolic pressures than whites, and from 35–64 years, higher diastolic levels (Fig. 2). These systolic pressures are not significantly different by analysis of covariance with age [$F_{(1, 281)} = 0.54$; NS] but for diastolic pressures the differences are highly significant [$F_{(1, 281)} = 7.82$; $P < 0.01$]. However, addition of body mass index as a second covariate revealed these diastolic differences to be entirely dependent on the much greater fatness of West Indian women [$F_{(1, 265)} = 0.24$]. This result is in keeping with the hypothesis that body mass is a more major determinant, even than age, of diastolic pressure than systolic pressure.

FIG. 1. Mean systolic and diastolic blood pressure in male black ●, white ○ and Asian ▲ factory workers.

Discussion

This study has found that male black West Indian factory workers in Birmingham do not have higher blood pressures on average than similarly aged whites or Asians. This finding is contrary to the initial

FIG. 2. Mean systolic and diastolic blood pressures in female black ● and white ○ factory workers.

hypothesis and to widely held clinical impressions. These results are not due to medical screening excluding hypertensives before starting employment as none of the factories studied operated such a policy. The only selection criterion was that employees were visibly fit enough to work. Possibly, unemployed or unfit black men might have had higher pressures causing morbidity precluding employment; this seems unlikely in the age-range we studied. An important point in this study is that almost all examinees were from social classes 3 to 5, and thus the ethnic groups were well matched.

The rise in average blood pressure with increasing age and hence the increase in arbitrary hypertension rates, conforms to the usual pattern seen in developed societies but is markedly different from the trend found among rural Africans, where hypertension is unusual (Akinkugbe, 1972).

Previous reports from Britain have included only small numbers of subjects from the ethnic minority groups. In the Northwick Park Heart Study (Mead et al., 1978), 48 day-shift and 38 of the night-shift male workers and 55 female day workers were black. Blood pressures were significantly higher in blacks than whites only in the day-shift, with no significant difference among the night workers. The mean ages of both groups for the day-shift were similar, but

range and standard deviations were not reported. Social class was also unevenly matched. Sever *et al.* (1978) found higher blood pressures in blacks than age-matched whites, but these subjects were volunteers combining people of West Indian and of African origin and all had been previously included in the Northwick Park study. The current study includes West Indians only and is larger than any other yet conducted in Britain.

Black women over 35 years did have higher mean blood pressures than white women but, using analysis of covariance, this is accounted for by the higher prevalence of obesity, even though large cuffs were employed on obese arms. More black than white women were on antihypertensive treatment (17% *v.* 4%) and were controlled (Table 1).

Little data are available on blood pressure distribution among Asians in Britain. A community survey of Asian women in Southall, West London (Keil *et al.*, 1980) recorded the overall prevalence of hypertension as 16%, which was similar to that for local white women. No data seem to have been reported for Asian men. Epidemiologically sound studies from rural and urban India have shown a relatively low prevalence of hypertension when compared with western societies (Padmavati and Gupta, 1959). The finding here of higher diastolic pressures and lower pulse pressures among Asian men is thus of great interest and requires confirmation.

The lack of a black/white blood pressure difference in this study is contrary to the United States experience, where it has been firmly established that black adults have higher pressures at all ages than whites (Comstock, 1957; Cassel, 1971; Gillum and Grant, 1982). The Chicago industry report, although more extensive, is the most directly comparable to this study, being factory based, but using a single (conventional) blood pressure reading. The 20048 white and 2077 black volunteer subjects screened only represented some 50% of the available workforce, whereas nearly 80% were screened here. However, the size effect in Chicago probably swamps any bias due to selective sampling (Stamler *et al.*, 1975).

There are 2 other possible reasons for the different outcome in this study compared to the U.S. Firstly, social class was closely matched here; in the U.S. when socioeconomic variations in screened populations are minimized, racial differences have been markedly reduced or abolished (Langford, 1981; Harburg *et al.*, 1973).

Secondly, black people from the West Indies who migrated to Britain may have genuinely different blood pressures from blacks longer resident in the U.S. Indeed, Miall detected only a slight excess of high blood pressure in Jamaica compared to his readings taken among white subjects in Wales (Miall

and Cochrane, 1961), although temperature differences may have reduced Jamaican values.

These results suggest that despite clinical impressions, average blood pressures are no higher in black than in white subjects. However, they do not exclude different mechanisms of patho-physiology in the development of hypertension in the different ethnic groups. A new finding requiring confirmation is the higher diastolic but lower pulse pressures recorded among Asian men.

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