Hypertension in the coloured population of the Cape Peninsula

KRISELA STEYN, P. L. JOOSTE, JEAN M. FOURIE, C. D. H. PARRY, J. E. ROSSOUW

Summary

In a random sample of 976 coloured people 17.2% of men and 18.4% of women were hypertensive (≥ 160/95 mmHg or receiving medication). In the same population 35.6% of men and 24.7% of women suffered from total hypertension (≥ 140/90 mmHg). Men between 25 and 44 years had a markedly higher prevalence of hypertension than women of the same age. Above this age the situation was reversed. Correcting for under- and over-cuffing increased the mean pressures in men and decreased them in older women.

Only 42.2% of hypertensive men and 69.9% of women were aware of their condition. Only 41.3% were on medication for it and a mere 16% had blood pressures below 160/95 mmHg. Hypertensives had significantly lower intakes of potassium, calcium, magnesium and saturated fat than normotensive subjects. Young hypertensives consumed more salt than older hypertensives. Both systolic and diastolic blood pressures were positively associated with alcohol consumption, smoking (in men), total serum cholesterol, low-density lipoprotein cholesterol, nonfasting triglyceride and uric acid levels.

Hypertensive subjects were less educated and showed more type A coronary-prone behaviour than normotensive subjects. A comparison of the prevalence of hypertension in the four South African ethnic groups is given.

Information on the prevalence of hypertension in the coloured population of South Africa is scanty. In the Cape Morbidity Survey 1 participating practitioners reported in 1969 that 1.2% of their consultations involved coloured patients who suffered from hypertension. These were mostly older patients. In a group of coloured male stevedores in Cape Town 2 the prevalence of hypertension was 34.9% when the study results were age-standardized against the South African coloured population of 1980. This is a remarkably high prevalence of hypertension for any population, but in that study very few subjects were from the younger age group, which could partly explain the results.

Methodology

The prevalence of hypertension and other risk factors for coronary heart disease were determined in an age- and sex-stratified random sample of 976 of the coloured population of the Cape Peninsula during September and October 1982. The subject population and survey techniques have previously been described. 3 Blood pressures were recorded after subjects had been seated for at least 5 minutes. A mercury manometer connected to a standard 12.5 x 23 cm cuff was used. The 1967 American Heart Association guidelines for measuring blood pressure 4 were applied. The diastolic pressure was taken as the point of muffling of the Korotkoff sounds (phase IV). Three intermittent readings were taken and the reading with the lowest systolic pressure was recorded. To ensure the validity of the readings, the following procedures were used to optimize the quality of both equipment and accuracy. All the Baumannometers were standardized by the manufacturers before the study. Training of the fieldworkers according to the American Heart Association guidelines began 6 weeks before the study. Throughout the training period a double-headed stethoscope was used by the trainer, who also was the reference person for the study.

Just before fieldwork began, the blood pressure readings by the observers were standardized against those of another experienced person to attain a correlation coefficient greater than 0.95. During the fieldwork readings were checked weekly against those of the reference person. End-digit preference was not found on subsequent analysis. One hundred random blood pressure readings were repeated not sooner than 7 days after the first reading to determine variation. This gave a good reproducibility, as reflected in correlation coefficients of 0.77 for systolic and 0.75 for diastolic readings, which are similar to the findings of other studies. 5

Results of the survey were returned to the participants with recommendations on a healthy lifestyle and indications, if necessary, of the need for medical advice.

Interpretation of data

The interpretation of the data, other than the hypertension data, has previously been described. 6 For determination of the prevalence of hypertension, the World Health Organization definition of hypertension (either systolic ≥ 160 mmHg and/or diastolic ≥ 95 mmHg) together with subjects on antihypertensive therapy whose blood pressure was below these values, was used. Total hypertension was defined as being present in people with a systolic blood pressure of ≥ 140 mmHg and/or a diastolic value of ≥ 90 mmHg. The results of the Pooling Project 7 showed that the risk for coronary artery disease was higher than average in people with total hypertension. In the Framingham Study 8 isolated systolic hypertension of ≥ 160/< 95 mmHg was also found to be related to hypertensive cardiac failure, stroke, coronary artery disease and occlusive peripheral arterial disease. Isolated diastolic hypertension was defined as a blood pressure of < 160/≥ 95 mmHg and joint...
hypertension as both systolic and diastolic readings above the WHO criteria (≥ 160/≥ 95 mmHg).

As a measure of adiposity the body mass index (BMI) (weight/height²) was used, with cut-off points for obesity at BMI ≥ 30 and overweight as BMI ≥ 25 for men and ≥ 24 for women. The error which can occur in blood pressure measurements because of under-cuffing thick arms and over-cuffing thin arms with a standard (12.5 x 23 cm) cuff was determined by using the correction factors formulated by Maxwell et al.¹ for standard cuffs.

For the purpose of comparing prevalence rates reported in different studies and populations the standard million population¹⁰ was used for age-standardizing prevalence rates, unless otherwise stated.

A diagnosis of a positive family history of hypertension-associated disease was made in people who had at least one parent reported as having had either a stroke, a myocardial infarct, angina or hypertension and/or a sibling that had suffered angina or a myocardial infarction.

Hypertensives were classified as on regular antihypertensive therapy if they reported taking such medication daily, and on occasional antihypertensive therapy if they reported taking medication less frequently.

To determine the nutrient intake of the study population, the amounts of food recorded on the 24-hour dietary recall sheet were converted by experienced dietitians to weights of food eaten and coded using the NRIND Food Composition Tables.¹¹ The coding enabled analysis of food intake in terms of nutrient intake.

Type A coronary-prone behaviour was computed from the adapted Bortner scale results by using main-component analyses.¹²

Results

The mean systolic and diastolic blood pressures for each age-sex group are shown in Table I. Like most other westernized populations studied, the mean systolic and diastolic blood pressures increased with age, with the exception of the diastolic pressure of the oldest group of men. The standard deviation also increased with age except for in the oldest group of women.

The result of using Maxwell's⁴ correction factor for the measuring of blood pressure in all people with a standard cuff was determined by using the corrected mean systolic and diastolic blood pressures were higher than the observed mean values. For women younger than 35 years a similar result was seen, but for women older than 44 years the corrected systolic and diastolic reading was lower than the observed value. The standard deviations of the distributions of each age group were little affected by the use of the correction factors for arm circumference. The observed blood pressures were used in the rest of this article and not the corrected values.

Table II shows the age- and sex-specific and crude prevalence rates of hypertension in the study population as well as the age-standardized rates as defined in the previous section. Women over 44 years of age had a much higher prevalence of hypertension than men of the same age; 72.6% of women over 54 years suffered from hypertension as against 45.6% of men. The high prevalence of hypertension in men between 25 and 44 years compared with women of the same age was striking.

The prevalence of additional forms of raised blood pressure is shown in Table III. Total hypertension¹³ was common in the population. Table I shows that for both sexes above the age of 44 years the mean diastolic value of each age group was above 90 mmHg, the diastolic cut-off point for mild hypertension. Women above 44 years and men above 54 years also exceeded the systolic cut-off point for mild hypertension of 140 mmHg. The age-standardized prevalence rate for total hypertension (against the coloured population aged 15 - 64 years in the Cape Peninsula) for men was 35.6%. This prevalence rate for men was about double the 17.2% found for hypertension (≥ 160/95 mmHg). For women the difference in prevalence rates of total hypertension (24.7%) and hypertension (18.4%) was not as marked.

Older women had a higher prevalence of isolated systolic hypertension than older men (11.6% of women and 3.3% of men in the age group 55 - 64 years). In the younger age group the condition was rare.

Isolated diastolic hypertension occurred in 10.6% of the women and 8.7% of the men. As regards hypertensives (≥ 160/95 mmHg), 83.7% of men and 73.4% of women had systolic blood pressures ≥ 95 mmHg, while systolic blood pressures were ≥ 160 mmHg in 28.5% of men and 34.8% of women. In only 22.1% of male and 26.6% of female hypertensives were both diastolic and systolic blood pressures ≥ 160/95 mmHg.

Only 42.2% of male and 69.9% of female hypertensives knew that they had hypertension. Only 3.9% of male hypertensives and 2.6% of female hypertensives reported having had a cerebral vascular accident. Of the men 10.9% and of the women 9.2% reported having had angina, and 4.7% of men and 3.9% of women had had a myocardial infarction. A family history of hypertension-associated disease was very common (58.6% of men and 62.8% of women).

Table IV shows the treatment status of the hypertensives. Only 41.3% reported using any antihypertensive therapy. It follows that 58.7% of controlled hypertensive participants were either previously undiagnosed, untreated, or uninformed about medication prescribed or had stopped their previous antihypertensive medication.

### Table I. Mean Systolic and Diastolic Blood Pressure (mmHg) in the Study Population

<table>
<thead>
<tr>
<th>Age group (yrs)</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>94</td>
<td>103</td>
</tr>
<tr>
<td>Systolic</td>
<td>120.4±15.6</td>
<td>114.9±10.8</td>
</tr>
<tr>
<td>Diastolic</td>
<td>76.3±10.0</td>
<td>73.2±9.1</td>
</tr>
<tr>
<td>25-34</td>
<td>96</td>
<td>94</td>
</tr>
<tr>
<td>No.</td>
<td>103</td>
<td>112</td>
</tr>
<tr>
<td>Systolic</td>
<td>132.2±16.7</td>
<td>125.8±19.8</td>
</tr>
<tr>
<td>Diastolic</td>
<td>89.5±11.9</td>
<td>83.4±13.9</td>
</tr>
<tr>
<td>35-44</td>
<td>103</td>
<td>94</td>
</tr>
<tr>
<td>No.</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Systolic</td>
<td>135.5±17.3</td>
<td>141.4±25.8</td>
</tr>
<tr>
<td>Diastolic</td>
<td>91.2±11.9</td>
<td>92.6±16.0</td>
</tr>
<tr>
<td>45-54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>90</td>
<td>95</td>
</tr>
<tr>
<td>Systolic</td>
<td>141.6±24.2</td>
<td>152.2±22.7</td>
</tr>
<tr>
<td>Diastolic</td>
<td>90.6±13.2</td>
<td>94.4±12.1</td>
</tr>
<tr>
<td>55-64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diastolic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table II. Prevalence (%) of Hypertension in the Study Population

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td>2.1</td>
<td>3.9</td>
</tr>
<tr>
<td>25-34</td>
<td>16.7</td>
<td>5.3</td>
</tr>
<tr>
<td>35-44</td>
<td>31.1</td>
<td>22.3</td>
</tr>
<tr>
<td>45-54</td>
<td>39.0</td>
<td>53.2</td>
</tr>
<tr>
<td>55-66</td>
<td>45.6</td>
<td>72.6</td>
</tr>
</tbody>
</table>

**Rates for 15-64-year-olds**

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude rate</td>
<td>26.8</td>
<td>30.8</td>
</tr>
<tr>
<td>Cape Peninsula rate</td>
<td>17.2</td>
<td>18.4</td>
</tr>
<tr>
<td>South African coloured rate</td>
<td>17.7</td>
<td>18.1</td>
</tr>
<tr>
<td>International rate</td>
<td>23.7</td>
<td>26.6</td>
</tr>
</tbody>
</table>

*Prevalence rate age-standardized against the coloured population of the Cape Peninsula (1980 census).*

*Prevalence rate age-standardized against the corrected values of the RSA (1980 census).*

*Prevalence rate age-standardized against the standard million population.*¹⁹
MEAN BLOOD PRESSURES IN
COLOURED MEN

Systolic

Corrected for arm circumference

Observed BP-readings

Diastolic

MEAN BLOOD PRESSURES IN
COLOURED WOMEN

Systolic

Corrected for arm circumference

Observed BP-readings

Diastolic

Fig. 1. Blood pressure readings corrected for arm circumference.

TABLE III. PREVALENCE OF DIFFERENT TYPES OF HYPERTENSION (HT)

<table>
<thead>
<tr>
<th>Age group (yrs)</th>
<th>% total HT</th>
<th>% joint HT</th>
<th>% isolated systolic HT</th>
<th>% isolated diastolic HT</th>
<th>% total HT</th>
<th>% joint HT</th>
<th>% isolated systolic HT</th>
<th>% isolated diastolic HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td>18,1</td>
<td>0,0</td>
<td>1,1</td>
<td>1,1</td>
<td>6,8</td>
<td>0,0</td>
<td>0,0</td>
<td>3,9</td>
</tr>
<tr>
<td>25-34</td>
<td>37,5</td>
<td>2,1</td>
<td>1,0</td>
<td>13,5</td>
<td>18,0</td>
<td>0,0</td>
<td>0,0</td>
<td>4,3</td>
</tr>
<tr>
<td>35-44</td>
<td>48,5</td>
<td>5,8</td>
<td>0,0</td>
<td>21,4</td>
<td>28,6</td>
<td>5,4</td>
<td>0,0</td>
<td>13,4</td>
</tr>
<tr>
<td>45-54</td>
<td>63,2</td>
<td>9,5</td>
<td>2,1</td>
<td>24,2</td>
<td>59,6</td>
<td>18,1</td>
<td>5,3</td>
<td>18,1</td>
</tr>
<tr>
<td>55-64</td>
<td>61,1</td>
<td>21,1</td>
<td>3,3</td>
<td>10,0</td>
<td>82,1</td>
<td>25,3</td>
<td>11,6</td>
<td>23,2</td>
</tr>
</tbody>
</table>

Rates for 15-64-year-olds

Crude rate

Cape* 45,6 7,5 1,5 14,2

Peninsula rate 35,6 3,8 1,1 10,6

South Africa coloured rate† 36,1 4,0 1,6 10,9

International rate‡ 42,3 6,3 1,4 13,0

33,1 7,81 2,6 11,0

*Prevalence rate age-standardized against the coloured population of the Cape Peninsula (1980 census).
†Prevalence rate age-standardized against the coloured population of the RSA (1980 census).
‡Prevalence rate age-standardized against the standard million population.¹²

Only 16% of the hypertensive participants had blood pressures below 160/95 mmHg.

More females (18,3%) than males (13,3%) had their hypertension controlled, and markedly more men (70,3%) than women (49%) had no medication and were probably undiagnosed. The most worrying finding is the fact that of the younger male hypertensives (< 45 years), 86% were not on any medication and only 8% had controlled hypertension. The older group of female hypertensives (≥ 45 years) had the highest rate of controlled hypertension and the lowest rate of untreated hypertension, but...
even in this group only 19,3% were controlled and 45,5% had not received treatment. In the year before the survey 71,9% of the hypertensives had had their blood pressure measured and this group of hypertensives had significantly better control of hypertension than the rest.

As regards the nutrient intake of this population, as calculated from the 24-hour dietary recall data, the following significant differences were found consistently between some of the groups of hypertensives and the rest of the study population. The following nutrient intake was assessed: potassium and sodium; calcium and magnesium; total cholesterol, saturated and polyunsaturated fat; polyunsaturated/saturated fatty acid ratio of the diet; plant and animal protein as well as the fibre and kilojoule content of the diet. The hypertensive subjects consumed less potassium, calcium, magnesium and saturated fat than non-hypertensives.

Questions on habitual salt consumption did not distinguish between hypertensive and normotensive people. The reason for this finding was that the younger age groups consumed more salt than the older participants who suffered from hypertension, while men consumed more salt than women.

To determine the effect of alcohol consumption on blood pressure the diastolic and systolic pressures of drinkers and non-drinkers were compared. The drinkers as a group had significantly higher diastolic and systolic blood pressures than the non-drinkers. No significant correlation could be found between the amount of alcohol used and the diastolic and systolic blood pressure levels.

The correlation between hypertension and BMI seen in many studies was also found in this study for both men and women when using the observed diastolic and systolic blood pressures. These correlations were weak and proved to be spurious when the systolic and diastolic blood pressures corrected for arm circumference were used.

Male smokers had significantly higher diastolic and systolic blood pressures than non-smokers. The group of hypertensives had significantly lower levels of education than the normotensive group. A significant positive correlation between type A coronary-prone behaviour and systolic blood pressure was found in this study. Significant weak correlations could be shown for both men and women between both systolic and diastolic blood pressures and the following: total cholesterol, low-density lipoprotein cholesterol, non-fasting triglycerides and uric acid levels.

**Discussion**

In most population surveys for hypertension the standard 12,5 x 23 cm cuff is used and only rarely are corrections for inappropriate cuffing applied to the results. From Fig. 1 it can be seen that such corrections for miscuffing when using Maxwell's correction factors markedly affected the observed results and therefore also the observed prevalence rates. In this study, a spurious association between BMI and observed findings with hypertension were found. The need for appropriate cuffing is again highlighted.

Hypertension is common in the coloured population of the Cape Peninsula (Table II), women above 44 years being particularly badly affected. Men aged 25 - 44 years had a much higher prevalence than women of the same age. The young men smoked, drank and consumed more salt than the young women, which might partly explain this higher prevalence.

To compare the prevalence of hypertension in the coloured population in the Cape Peninsula with that of other South African populations, the studies of Seedat and Seedat on urban whites, Indians and Zulus are best used, since this study was the only other domiciliary hypertension survey in South Africa comparable in technique of data collection. Zulus (23,8%), coloureds (23,7%) and whites (22,9%) had higher and Indians (12,5%) the lowest hypertension prevalence rates among South African men. Of South African women urban Zulus had the highest prevalence rates (29,2%), followed in order by coloureds (26,2%), Indians (17,4%) and whites (15,1%).

The prevalence rates of hypertension for urban blacks in South Africa reported by Selset et al. were similar to those reported for American (Georgia) Negroes. These American blacks had higher prevalence rates of hypertension than American whites. As the coloured population had prevalence rates comparable to those of the South African blacks, it follows that the former had a level of hypertension comparable to that of American blacks but higher than that of urban American whites, urban whites elsewhere and rural South African whites.

When mean systolic and diastolic blood pressures of coloureds are compared with those reported by Seedat and Seedat in urban whites, Zulus and Indians, those for coloured men were higher than for the other three race groups within the ages of 25 and 54 years. For the mean systolic readings, those of the coloureds were significantly higher (t test) than those of Indians aged 15 - 54 years, Zulus aged 15 - 44 years, and whites aged 25 - 44 years. The mean diastolic readings of coloured men were significantly higher than those of Zulus aged 15-54 years, of Indians between 15 and 64 years and of whites between 25 and 64 years.

For the women these differences were not so marked but again the tendency for high mean values was seen. Significantly higher systolic mean values, by t test, than in Zulu women aged 15 - 24 years, Indian women aged 15 - 34 years, and white women aged 15 - 64 years were found; significantly higher diastolic mean values than in Zulu women aged 15 - 24 years, Indian women aged 15 - 64 years, and white women aged 34 - 64 years were found.

Considering that total hypertensives have a higher than average risk for coronary heart disease, Table III shows that more than a third of coloured men and about a quarter of coloured women between 15 and 64 years were at risk of coronary heart disease because of the level of blood pressure. Isolated systolic blood pressure, a condition of older people, was also present in the coloured population, particularly the older women.

Too few hypertensives knew about their condition. Relatively few hypertensives reported having had a stroke compared with the number who reported angina or a myocardial infarct, which is surprising in a population with such a high prevalence of hypertension, a high stroke mortality rate and a high rate of family history of hypertension-associated disease. The results may be confounded by a high stroke fatality rate, nevertheless, since strikingly higher stroke rates were reported by hypertensives than normotensives.
Effective hypertension intervention programmes must take into consideration the findings on salt intake in the younger age groups and the association between alcohol and hypertension. The implications of the link between smoking, nutrient intake, low level of education, type A behaviour, and serum total and low-density lipoprotein cholesterol, triglyceride and uric acid levels with hypertension will have to be dealt with. Individuals with a clustering of risk factors need to be identified to bring about an overall reduction of risk factors for coronary heart disease.

To introduce an improved hypertension intervention programme for the coloured population of the Cape Peninsula, additional methods to the ones employed at present will have to be used — particularly with regard to the identification of the younger hypertensive who at present is mostly undiagnosed and untreated in a population where hypertension becomes a problem at a relatively young age.

This study was done in collaboration with the Institute for Communication Research of the Human Sciences Research Council. Miss M. Steyn and Dr P. C. J. Jordaan played a central role in the planning and execution of this project. The authors wish to record their indebtedness to the Bureau for Research Support Services of the HSRC and in particular to Mr P. Crause, the Assistant Director of the Western Cape Regional Office, and Messrs O. Valley, D. A. Louw and S. A. Persent, fieldwork organizers for this region. The able and dedicated service of the school nursing sisters of the Regional Office of the Department of Health and Welfare contributed greatly to this study. The laboratory assistants of the NRIND executed the analyses most ably, and for this we thank them. Misses M. E. J. Louw and L. J. Levy supervised the school nursing sisters’ fieldwork. This was of great value to the study. The authors also record their indebtedness to Miss G. Joubert and Mr D. Chalton for assistance with statistical analysis of data.

REFERENCES

News and Comment/Nuus en Kommentaar

Erect abdominal radiographs
A time-honoured ritual in investigation of the acute abdomen is the ordering of the erect and supine radiograph of the abdomen. Is this really necessary? A recent report puts forward the view that the erect radiograph may be superfluous (Field et al., Br Med J 1985; 290: 1934). The radiographs of 102 consecutive patients with acute abdominal pain were reported on initially by junior surgical staff and subsequently by a consultant radiologist. Special note was taken of the value of the erect abdominal over the combination of the supine abdominal and the erect chest radiograph. No changes in patient management were noted on information obtained from the erect abdominal radiograph, and the consultant radiologist found that in only 5 cases had it yielded useful or additional information. Even in these 5, abnormal features were also visible on the supine film, and in 3 of these, subtle but important information had been missed. In another 5 cases, information obtained from the erect film was potentially misleading.

The authors feel that the erect abdominal radiograph should be discontinued as an investigation for abdominal pain, and that more reliable information can be obtained from a supine abdominal and an erect chest radiograph. The latter not only shows gas under the diaphragm, but may also reveal unexpected chest disease.

Exercise and depression
One look at the agonized expression on the face of a passing jogger is enough to convince the casual, immobile onlooker that he or she cannot be getting much enjoyment out of it. However, there is some evidence that aerobic exercise can improve the mood of depressive subjects; this hypothesis was recently investigated by studying 43 psychiatric patients with major depression who were subjected to a programme of aerobic exercises (Martinsen et al., Br Med J 1985; 291: 109).

Twenty-four patients in the study group and 19 patients in the control group completed the trial, which lasted for 9 weeks. The training group was given a programme of aerobic exercises for 1 hour 3 times a week, supervised by an instructor. The control group attended occupational therapy classes for the same period. Physical condition was measured using a bicycle ergometer with oxygen uptake studies, and depression was measured using standard testing procedures.

The training group showed a significant diminution in the level of depression, which seemed to be linked to increases in maximum oxygen uptake. The authors are aware that other factors such as the extra attention and enthusiasm of the coach may have played a part, but they nevertheless conclude that a training programme has a marked antidepressive effect in hospital psychiatric patients under the age of 60 years.