The epidemiology of hypertension in family practice in Cape Town

W. M. PICK, J. E. MYERS, A. R. SAYED, J. DHANSAY, R. L. GEORGE, A. W. BARDAY

Summary

A prevalence study of hypertension in 8 family practices in low socio-economic areas of Cape Town examined 1 046 patients over the age of 15 years. The crude prevalence rate of hypertension was 20,26%. There was no significant sex difference. Systolic pressure, diastolic pressure and hypertensive status increased with age and body mass index (BMI). There were complex relationships with regard to sex in that the female sex was predictive of hypertensive status after the age of 45 years unexplained by differences in BMI. After adjusting for age, BMI and sex differences, widowhood, poor education, obesity, a family history of hypertension or stroke and a past history of hypertension were significant predictors of hypertensive status. Smoking status, occupational social class or property ownership were not predictive.

Fifty-one per cent of hypertensive subjects were treated. Of those receiving treatment, 30% were controlled resulting in a control prevalence of only 18%. Younger male subjects were better controlled by treatment. A strong need for improved diagnosis and treatment of hypertension in family practice exists in this region.

S Afr Med J 1990; **78:** 7-10.

Hypertension is a common disease in South Africa and is an important cause of mortality and morbidity.[1] Various community-based studies have found prevalences ranging from 18% to 25%.[2-4] Family practitioners, as primary care givers, are ideally situated in the community, where they are often the first and sometimes the only point of contact between patients and the health services, in many cases rendering ongoing care which may continue for decades and generations.

Active case-finding and treatment in family practice has been shown to reduce mortality from stroke and congestive cardiac failure,[5] and many investigators share the view that efforts to control hypertension should therefore be directed at family practice.[6-8] Studies in the UK have revealed considerable under-ascertainment of hypertension in this setting. Only 24% of adult patients in inner London and 43% in outer London over a 5-year period, and 53% of adults in north-west London over a 10-year period, had blood pressure readings recorded by family practitioners.[9,10] There are no published data available on the epidemiology of hypertension in family practice in South Africa.

Department of Community Health, University of Cape Town
W. M. PICK, M.B. CH.B., M.F.G.P., M.MED. (COMM. HEALTH), F.F.C.H. (C.M.), D.T.M. & H., D.P.H.
J. E. MYERS, B.SC., M.B. CH.B., M.D., D.T.M. & H.
A. R. SAYED, M.SC.
Klipfontein and Jupiter Roads, Surrey Estate, Cape Town
J. DHANSAY, M.B. CH.B., M.F.G.P., D.T.M. & H., D.P.H.
Thornton Road, Athlone, Cape Town
R. L. GEORGE, M.B. CH.B., M.F.G.P., D.T.M. & H., D.P.H.
College Road, Rylands, Cape Town
A. W. BARDAY, M.B. CH.B., M.F.G.P., D. FOR. MED., D.T.M. & H., D.P.H., D.H.S.M.

Accepted 18 Jan 1990.

Patients and methods

Eight family practices were randomly selected from 89 listed in the Telephone Directory for the Cape Flats area of Cape Town. The population living in this area is predominantly blue-collar working class. The Cape Flats area includes the suburbs of Bellville South, Parow South, Elsies River, Bishop Lavis Township, Bonteheuwel, Langa, Bridgetown, Kewtown, Heideveld, Athlone, Crawford, Gatesville, Manenberg, Guguletu, Nyanga, Philippi, Hanover Park and Mitchell's Plain.

A qualified nursing sister trained to administer a questionnaire and to do anthropometric and blood pressure measurements, with audiometrically confirmed normal hearing, spent 2 weeks in each practice and examined every patient over the age of 15 years between July and October 1985.

Questionnaire data were collected on family history of hypertension, stroke and cardiac disease; past history of stroke and cardiac disease; occupational social class; education; the use of oral contraceptives; cigarette smoking; and treatment. All instruments, including a standard bathroom scale and a mercury sphygmomanometer, were calibrated before and after use. The method of measuring blood pressures was that described by the participants at the Third Mild Hypertension Conference in Burgestock, Switzerland, in 1982.[11] Blood pressures were measured with the patient in a sitting position with the left arm resting on the desk. Three readings were taken and the lowest reading was recorded. No correction was made for cuff size. Hypertension was defined as a systolic blood pressure $\geqslant$ 160 mmHg and/or a fifth phase diastolic blood pressure $\geqslant$ 95 mmHg. Normal blood pressure was defined as a systolic blood pressure $\leqslant$ 140 mmHg together with a diastolic blood pressure $\leqslant$ 90 mmHg. Borderline hypertension was defined as blood pressure readings between the normal and hypertensive ranges.[12] Patients who had blood pressures in the normotensive range but who were on treatment for hypertension were regarded as being hypertensive. Obesity was defined as a body mass index (BMI) (weight/height^2) of 30 or greater.

After training, the interviewer's readings were correlated with those of an experienced observer, yielding a correlation coefficient of 0,95.

Statistical analysis was conducted on a mainframe computer using the BMDP statistical analysis package. Contingency table analysis was used to investigate bivariate associations between variables of interest. Multiple linear regression and analysis of co-variance (continuous outcomes) and logistic regression (categorical outcomes) were used to investigate the predictive effects of known and suspected risk factors on various outcomes, and to control for confounding or account for interactions.

Results

The total number of patients included in the study was 1 046 of which 516 were men. The mean age was 33,7 ± 12,7 years and the median age 31 years (range 15 - 85 years). The prevalence of hypertension was 20,26% (95% confidence interval (CI) = 17,8 - 22,6%).

Multiple linear regression analysis of systolic blood pressure on the independent variables age, BMI, sex and smoking status revealed that all were independent predictors, in the order given, for elevated pressure. When ex-smokers were excluded from the analysis there was no independent effect of smoking. Variation in pressure was accounted for by variations in age, sex and BMI only. Only variations in age and BMI were predictive of variation in diastolic pressure.

Figs 1 and 2 show that up to the age category 35 - 44 years men had higher mean systolic and diastolic blood pressures than women. After 44 years women had higher mean blood pressures than men.

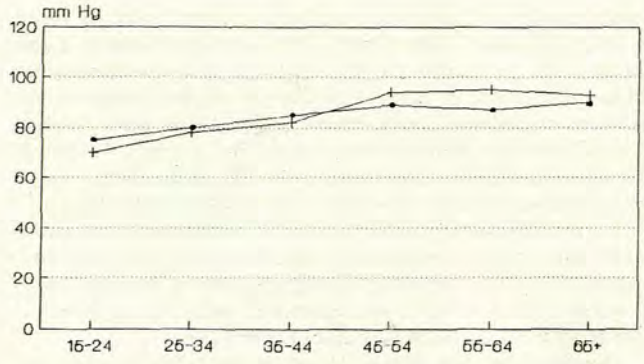

Fig. 1. Mean diastolic pressure by age and sex (• — • = men; + — + = women).

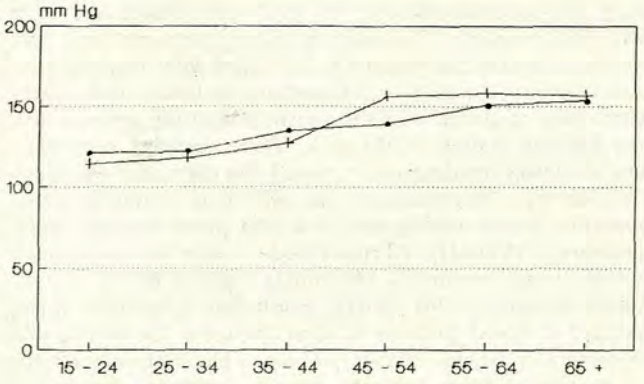

Fig. 2. Mean systolic pressure by age and sex (• — • = men; + — + = women).

After adjusting for age and BMI differences by analysis of covariance, it was not possible to obtain adjusted mean values for systolic and diastolic pressure for men and women over the entire age range or for ages < 45 years because the slopes of the graphs were not equal; this rendered the groups incomparable. Further analysis revealed that women over the age of 45 years had significantly higher adjusted mean systolic and diastolic pressures than men (Table I).

TABLE I. SEX AND BLOOD PRESSURE (MEAN ± SD) ADJUSTED FOR AGE AND BMI

Sex	No. of patients	Adjusted group Systolic*	Diastolic*
Men	**106**	**144,04 ± 2,67**	**87,00 ± 1,43**
Women	**108**	**157,68 ± 2,64**	**94,62 ± 1,41**

*$P < 0,0001$.

Fig. 3 shows that the proportion of hypertensive subjects increased with age, in addition to an apparently higher prevalence in older women. Logistic regression of hypertensive status on age (categorical ≤ 45, > 45), BMI, sex and smoking showed that only age (odds ratio (OR) = 2,93; 95% CI = 2,44 - 3,51%) and BMI ($\beta = 0,39$; $P < 0,005$) were significant predictors of hypertension in the order given. Only for age > 45 years was female sex a significant predictor after adjusting for age (continuous) and BMI (adjusted OR = 1,72; 95% CI = 1,25 - 2,36%).

Bivariate associations of hypertension with other variables are shown in Table II and measures of association adjusted for relevant co-variates in Table III.

Widowhood was associated with hypertension while single status was protective compared with married subjects as the baseline. These effects were unconfounded by age and BMI

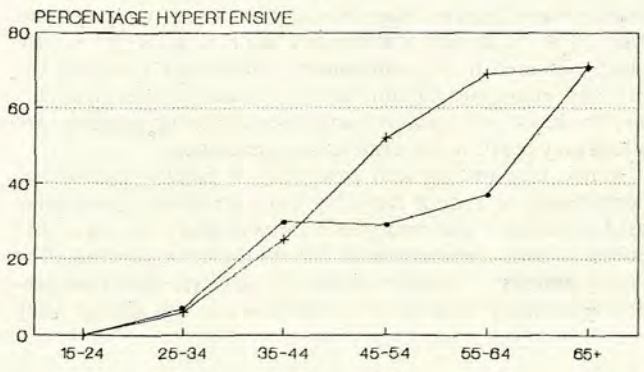

Fig. 3. Hypertension by age and sex (• — • = men; + — + = women).

TABLE II. BIVARIATE ASSOCIATIONS OF VARIABLES WITH HYPERTENSION

Variable	Prevalence in hypertensive subjects	Prevalence in normal subjects	χ^2-test	df	*P* value
Family history of hypertension	**27**	**18**	**11,2**	**1**	**< 0,001**
Family history of stroke	**29**	**19**	**6,7**	**1**	**< 0,01**
Past history of hypertension	**84**	**9**	**474,5**	**1**	**< 0,0001**
Obesity	**43**	**15**	**76,1**	**1**	**< 0,0001**

TABLE III. ADJUSTED ODDS RATIOS, 95% CONFIDENCE INTERVALS AND *P* VALUES

Variable	Adjusted OR	95% CI	*P* value
Single status	**0,30**	**0,23 - 0,52**	**< 0,0001**
Divorced	**1,07**	**0,49 - 2,36**	**NS**
Widowed	**2,43**	**1,15 - 5,10**	**< 0,05**
Education	**1,22**	**1,11 - 1,69**	**< 0.05**
Family history of hypertension	**1,68**	**1,23 - 2,27**	**< 0,005**
Family history of stroke	**1,33**	**1,04 - 1,71**	**< 0,05**
Past history of hypertension	**6,21**	**4,72 - 8,18**	**< 0,0001**
Obesity	**1,49**	**1,21 - 1,82**	**< 0,0005**

differences between the groups as shown by forced stepwise logistic regression analysis.

Neither occupational social class nor home-ownership was associated with hypertension after adjusting for the effect of age. Subjects with > 10 years of schooling had a significantly lower risk of hypertension than those with < 10 years' schooling after adjusting for age and BMI differences.

A positive family history of hypertension and previous stroke were both significantly more prevalent in hypertensive subjects than in normotensive subjects. Both associations were unconfounded by age and BMI. There were no differences in the proportions of hypertensive subjects and normotensive subjects with a positive family history of cardiac disease or angina pectoris. A positive past history of hypertension was significantly associated with hypertension after adjusting for the effects of age, BMI and sex. After adjusting for age, there was no association with previous stroke. Neither a past history of stroke nor that of heart disease was significantly associated with hypertension after adjustment for age. Of the 212 hypertensive subjects 159 (75%) had a past history of hypertension. In addition, 27 patients with a past history of hypertension were found to be normotensive.

Overall categorical analysis showed no association between smoking and hypertensive status when ex-smokers were excluded. Ex-smokers constituted a group with a very high hypertension prevalence — significantly higher than in both smoking and never-smoked groups. There was no relationship between the number of cigarettes smoked during a week or during a weekend (which were identical with a mean value of 6/d) and hypertensive status. Of the hypertensive women, 0,8% (only 1 subject) used oral contraception while 10% of normotensive women used oral contraception. Of the normotensive subjects 15% were obese while 43% of the hypertensive subjects were obese. This difference was statistically highly significant. After adjustment for age and sex the association was still significant.

Of the 103 hypertensives on treatment, 12,6% used a vasodilator only, 8,7% used a β-antagonist only, 43,6% used a diuretic only, while 14,6% used both a diuretic and a β-antagonist and 1% used a calcium antagonist and a vasodilator. Control, regarded as a blood pressure < 160 mmHg systolic and 95 mmHg diastolic while on medication, appeared better on multidrug treatment and for men but these differences were not statistically significant. Older patients appeared to be less well controlled than younger patients. Hypertensive subjects who were on treatment without control numbered 65 (30,6%) while 109 (51%) of the hypertensive subjects were not on any treatment. Of all the hypertensive subjects in the study only 18% (38) were on treatment and were adequately controlled.

Discussion

The proportion of patients who were hypertensive in our sample was very similar to that found in other community-based studies in South Africa, although different populations were being compared and different diastolic criteria (Korotkoff phase IV v. phase V) were used in measuring blood pressure.[2-4] This is in contrast with the Cape Morbidity Survey, which found that in a haphazard sample of practices, a comparable group of hypertensive subjects formed only 1,2% of all general practice consultations in 1969.[13] It is surprising that the proportion of hypertensive subjects was not greater, given that one would expect a clustering of hypertensives in family practice. This is likely to be accounted for by the different age distributions of the subjects in this study when compared with the subjects in the community-based studies.

Widowhood was positively associated with the proportion of hypertensive subjects in our study.

A study[14] done in the elderly in Cape Town has confirmed the strong relationship between hypertension and the death of a spouse. The lack of statistically significant differences in the prevalence of hypertension between the social classes found in this study contrasts with other studies.[15] This may be explained by a very narrow socio-economic profile in a predominantly working-class practice population. The inverse relationship between education and hypertension found in this study is similar to the findings of the Hypertension Detection and Follow-up Co-operative Group in the USA.[16] People with few years of education are likely to be employed in semi-skilled and manual occupations; this has been shown by some workers[17] to be related to stress in the workplace, an important determinant of hypertension.

The familial aggregation of hypertension has been shown in many studies.[18-20] The lack of difference in the family history of angina pectoris and heart disease is somewhat surprising. The fact that some patients, who had been labelled as hypertensive in the past, were found to be normotensive could be due to misdiagnosis or misunderstanding by the patient but is most probably due to the phenomenon of regression to the mean.[21] In view of the effect of labelling, as shown by Haynes *et al.*,[22] a further study of this phenomenon is warranted. It is not surprising that 75% of hypertensive subjects knew of their condition, a figure that is far greater than that found in other local community-based studies. Some of the subjects obviously consulted their doctors for treatment for hypertension. This figure is lower than that found in other studies, e.g. the San Antonio Heart Study[23] in which 84,6% of hypertensive subjects knew of their condition.

The fact that ex-smokers had a significantly greater prevalence of hypertension than smokers and never-smokers suggests that they stopped smoking because of the presence of hypertension and had been told by their doctors to stop. There

was no association between blood pressure levels and smoking after exclusion of ex-smokers; this was most probably due to a 'healthy smoker' effect. Only 1 hypertensive subject used oral contraception, reflecting the good practices of the major suppliers of contraception in this area — the family planning clinics. The well-known association between obesity and hypertension was confirmed.

The control of blood pressure by drugs was poor, with more than half the subjects identified as hypertensive in this sample not receiving treatment. The fact that control became worse as the age increased could be a result of higher levels of blood pressure being accepted as normal in the older subjects and, while it may be a reflection of poorer compliance, it has been shown that compliance is generally not age-related.[24]

Most of the subjects receiving treatment were on diuretics, which was found to be the case in north-west London family practices by Kurji and Haines[25] and also by Ritchie and Currie in north-east Scotland.[26] It was surprising to find that more patients in our study used vasodilators than β-antagonists, the latter having become so popular in recent years. This may well relate to the relative high cost of β-antagonists. The tendency for patients on multidrug therapy to be better controlled reinforces the philosophy that multiple drugs in lower doses reduce side-effects and improve control.

Most patients with hypertension can be simply managed by family physicians, as has been shown in many other parts of the world. The management of hypertension in the area under study leaves much to be desired. Family physicians need to be reorientated to screen for hypertension and to employ strategies aimed at improving follow-up of hypertensive subjects. A hypertension register in every family practice is an essential part of this strategy. It has been shown that practice audit *per se* improves control of hypertension. Raising the consciousness of the public as well as health professionals about the seriousness of the problem is another essential ingredient in such a programme. There is also a need for ongoing research into compliance and compliance-improving strategies if hypertension is to be controlled and its devastating consequences reduced.

The authors would like to acknowledge all participating patients and practitioners, Sister E. M. Gordon, Drs P. Disler, M. Hoffman, M. Jacobs and G. Hussey, the Institute of Biostatistics of the South African Medical Research Council and ICI Pharmaceuticals.

REFERENCES

1. Wyndham CH. The loss from premature deaths of economically active manpower in the various populations of the RSA. *S Afr Med J* 1981; **60:** 411-419.
2. Seedat YK, Seedat MA, Reddy K. The prevalence of hypertension in the Indian population of Durban. *S Afr Med J* 1978; **54:** 10-15.
3. Seedat YK, Seedat MA, Nkomo MN. The prevalence of hypertension in the urban Zulu. *S Afr Med J* 1978; **53:** 923-927.
4. Steyn K, Jooste PL, Langenhoven ML *et al.* Coronary risk factors in the 'coloured' population of the Cape Peninsula. *S Afr Med J* 1985; **67:** 619-625.
5. Rudnick KV, Sackett DL, Hirst S, Holmes C. Hypertension in a family practice. *Can Med Assoc J* 1977; **117:** 492-497.
6. Beevers DG. Do we need hypertensionologists? *Br Med J* 1983; **287:** 885-886.
7. Stephens WP, Tunbridge RD, Moss DA. Evaluation of screening for hypertension in general practice with an automatic machine. *Br Med J* 1983; **287:** 1597-1600.
8. Bannan LT, Beevers DG, Jackson SHD. ABC of blood pressure management: detecting hypertensive patients. *Br Med J* 1982; **282:** 1211-1213.
9. Heller RF, Rose G. Current management of hypertension in general practice. *Br Med J* 1977; **1:** 1442-1444.
10. Michael G. Quality of care in managing hypertension by case-finding in north-west London. *Br Med J* 1984; **288:** 906-908.
11. Memorandum from a WHO/ISH meeting. Guidelines for the treatment of mild hypertension. *Bull WHO* 1983; **61:** 53-56.
12. World Health Organisation Expert Committee. Arterial hypertension. *WHO Tech Rep Ser* 1978; No. 686.
13. Silbert MV. The Cape Morbidity Survey and its significance in the training for general practice. *S Afr Med J* 1970; **44:** suppl. 21 Feb., 3-28.
14. Elk R, Nash ES. Hypertension in the aged — psychosocial and psychiatric concomitants in a 'coloured' community. *S Afr Med J* 1985; **67:** 1046-1049.
15. National Center for Health Statistics. *Hypertension and Hypertensive Heart Disease in Adults* (Vital Health Statistics, Series 11, No 13). Washington DC: PHS Publication No. 1000, USPGO, May 1966.
16. Hypertension Detection and Follow-up Co-operative Group: Race, education and prevalence of hypertension. *Am J Epidemiol* 1977; **106:** 351-361.
17. Myers JE, White NL, Cornell JE. Prevalence of hypertension in semi-skilled manual workers. *S Afr Med J* 1982; **62:** 894-898.
18. Johnson BC, Epstein FH, Kjelsberg MO. Distributions and familial studies of blood pressure and serum cholesterol levels in a total community — Tecumseh. *J Chron Dis* 1965; **18:** 147-160.
19. Winkelstein W jun., Kantor S, Ibrahim M, Sackett DL. Familial aggregation of blood pressure: preliminary report. *JAMA* 1966; **195:** 848-850.
20. Hayes CG, Tyroler HA, Cassel JC, Hill C. Family aggregation of blood pressure in Evans County, Georgia. *Arch Intern Med* 1971; **128:** 965-975.
21. Fletcher RH, Fletcher SW, Wagner EH. *Clinical Epidemiology — The Essentials.* Baltimore, Md: Waverley Press, 1982: 37-38.
22. Haynes RB, Sackett DL, Taylor DW, Gibson ES, Johnson AL. Increased absenteeism from work after detection and labelling of hypertensive patients. *N Engl J Med* 1978; **299:** 741-744.
23. Franco J, Stern M, Rosenthal M *et al.* Prevalence, detection and control of hypertension in a biethnic community (The San Antonio Heart Study). *Am J Epidemiol* 1985; **121:** 229-232.
24. Wagner EH, Truesdale RA, Warner JT. Compliance, treatment practices and blood pressure control: community survey findings. *J Chron Dis* 1981; **34:** 519-525.
25. Kurji KH, Haines PJ. Detection and management of hypertension in general practices in north-west London. *Br Med J* 1984; **288:** 903-906.
26. Ritchie LD, Currie AM. Blood pressure recording by general practitioners in north-east Scotland. *Br Med J* 1983; **286:** 107-109.