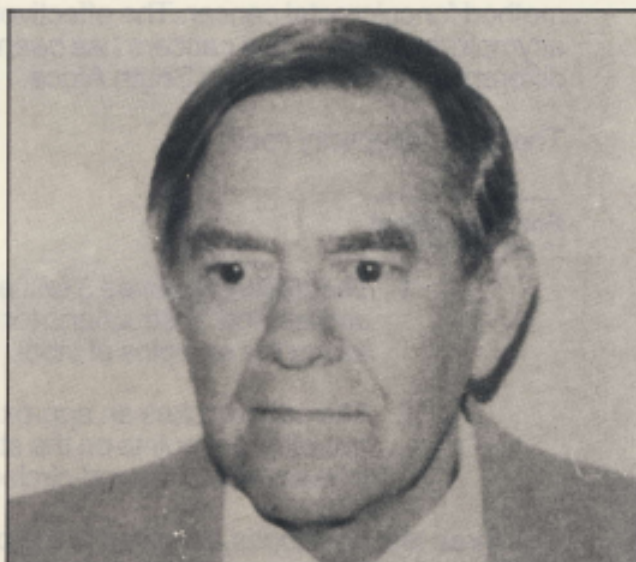


The Prevalence of Hypertension in a Specific Industrial Population

BC Botha

Summary

A descriptive study was carried out to determine the prevalence of hypertension in the Black male employee population of a factory. The findings are analyzed and compared with a study on the urban Zulu in Natal that was published in 1977¹² (looking at the hypertensive state in different ethnic groups.) Recent literature pertaining to hypertension, especially with reference to the occupational medical aspect, is reviewed. This effective screening programme has led to a therapeutic programme at the factory where not only hypertension, but other medical conditions are diagnosed and treated.



Curriculum Vitae

Dr Ben Botha received the MBChB (1956) at Pretoria University and whilst being a student was editor of *Speculum*, the medical students' weekly magazine (1955). After his housemanship at the Far East Rand Hospital, he joined a four-man general practice in Brakpan where he remained for 26 years. During this time he obtained M PraxMed (1971), MFGP(SA) (1974), and Diploma in Occupational Medicine (1978) at Pretoria University. Dr Botha then switched to the Witwatersrand University where he obtained a DTM & H (1981) and Diploma in Community Health (1983). He has published several articles related to primary medical care and occupational medicine, and on two occasions was awarded the Noristan Silver Medal. He left general practice at the beginning of this year to do occupational medicine at Dunsward Iron & Steel Works (Isacor-group).

KEYWORDS: Hypertension; Occupational Health Services; Blood Pressure Determination; Stress, Psychological; Urban Health; Blacks; Patient Education; Patient Compliance; Physicians, Family.

SUBJECTS AND METHODS

The study population consisted of all the male employees in a factory that extracts and refines precious metals and also produces sulphuric acid as a by-product. Because of exposure in the work environment to silica dust, all workers undergo compulsory medical as well as radiological examination of the chest prior to employment and periodically thereafter. This results in every employee going through the company's medical centre at least once in eight months; as well as radiological screening for pneumoconiosis and tuberculosis, chemical urinalysis and a blood pressure check are carried out at all such attendances².

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The total male Black work force of 685 were examined in this way over a period of eight months from December 1982 to July 1983, ensuring a 100 per cent response rate. The files of subjects entered into the study were marked with a sticker to rule out duplication.

Standardization of equipment is taken care of in that the same mercury sphygmomanometer was used throughout². Most of the readings were done by the same observer, a qualified Black nursing sister who speaks the different languages of the workers fluently and is also well accustomed with their cultural habits, in this way helping to create a more relaxed atmosphere at the time of examination¹². The workers are also fully informed as to the purpose of the examination. Only on occasion were examinations done by another staff member, eg when the regular sister was on leave.

The observer was fully instructed in taking accurate blood pressure readings using a dual stethoscope and spot checks were carried out to ensure that observations were properly made². Readings were taken using a standard cuff placed directly over the brachial artery, applied snugly to the bared, unrestricted arm two or three centimetres above the antecubital fossa and supported at the level of the heart at an angle of about 45 degrees away from the trunk. The cuff was rapidly inflated to 20-30 mmHg above the point at which the brachial artery was obliterated. Cuff pressure was permitted to fall at a rate of 2-3 mmHg per pulse beat, and the point of first appearance of an audible pulse beat was recorded as the systolic blood pressure. The systolic and diastolic blood pressures (SBP and DBP) (first and fifth phases) were measured by the auscultatory method. Readings were recorded to the nearest 5 mmHg gradation below the observed figures, taken in the right arm at all times^{12, 4}, accepting the statement that there is no significant statistical difference between the blood pressure readings in the two arms¹². If the DBP was measured at 90 mmHg or above, a second blood pressure measurement was taken after 30 minutes.

Essential hypertension is a leading cause of early retirement.

All people so classified as hypertensive for survey purposes were referred to the company doctor for further evaluation. At this second stage digit preference was guarded against. The World Health Organization definition of hypertension was used:

WHO: DEFINITION OF HYPERTENSION^{4,12}

Age in years	Diastolic threshold	and/or	Systolic threshold
Under 30	90		150
30-65	95		160
Over 65	95		165

Diurnal variation in blood pressure was avoided² in that all examinations are carried out between 08h00 and 10h00.

FINDINGS

This descriptive study was undertaken to determine the prevalence of hypertension in a specific population and to compare it with findings in a study on the prevalence of hypertension in the urban Zulu¹². Because the accent in the latter was placed on an ethnic group, it was decided to divide the study population into ethnic groups (nine in all) and to determine the prevalence of hypertension in each group in order to compare such findings with those in the study carried out on the urban Zulu¹².

Seedat found the prevalence of hypertension in the urban Zulu male to be 23,0% (with the urban Zulu female at a higher level, viz 27%)¹². The prevalence of hypertension in the Zulu males in the study population was found to be much lower, namely 8,0%, (95% confidence interval 4-14) roughly one third of that of the Seedat study. The prevalence of hypertension in the study population as a whole was found to be 8,03%, a finding closely resembling that of the Zulu males in the study population. (Table 1).

Although the sizes of the ethnic subsets were small, the prevalence of hypertension amongst Shangaans (15,6%) is striking and there is a significant difference between the prevalence amongst the Shangaans and the Tswana (Chi² Test 3,91 ; 0,05 > p > 0,02).

TABLE 1
The Prevalence of Hypertension in the Study Population, Depicting Ethnic Group, Number of Individuals in Each Group, and Prevalance of Hypertension in Each Group.

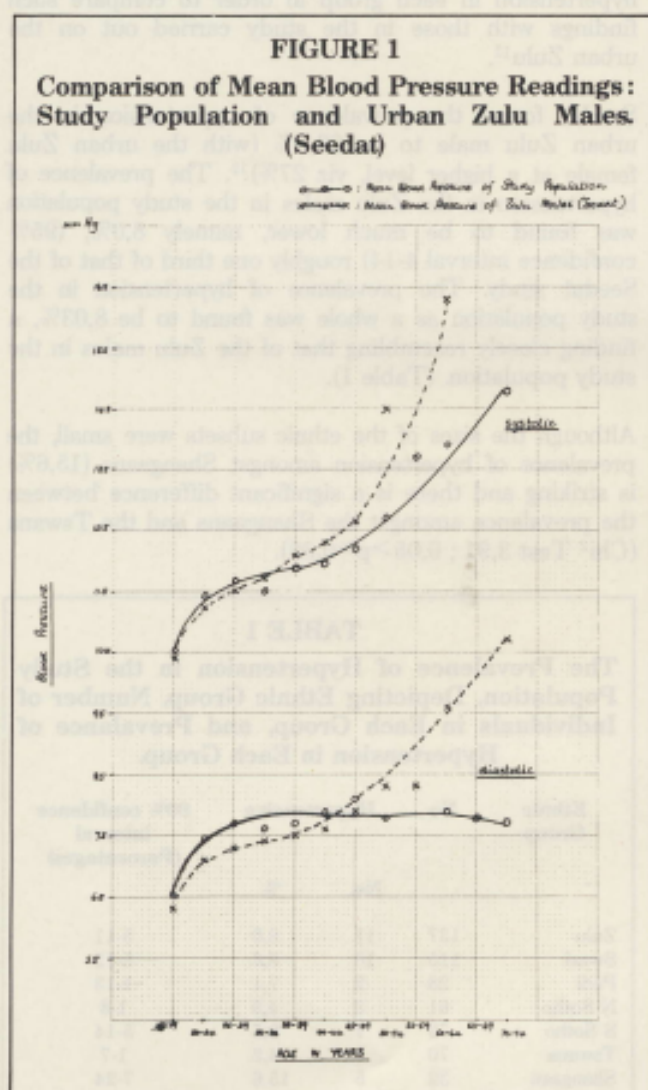
Ethnic Group	No	Hypertensive		80% confidence interval (Percentages)
		No.	%	
Zulu	137	11	8,0	5-11
Swazi	115	10	8,6	5-12
Pedi	28	2	7,1	1-13
N Sotho	61	3	4,9	1-8
S Sotho	73	7	9,5	5-14
Tswana	70	3	4,2	1-7
Shangaan	32	5	15,6	7-24
Xhosa	92	9	9,7	6-14
Ndebele	71	4	5,6	2-9
Other	6	1	16,6	
Total	685	55	8,03	7-9*

*95% confidence interval: 6-10.

Mass screening of the population seems to be the major weapon in the fight against hypertension.

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The mean blood pressure readings, both systolic and diastolic, followed a gradual upward trend with age with a steeper incline in both systolic and diastolic pressures from around the age of 50 years (Fig 1). The findings are in contrast with the Seedat study where it is stated that "mean systolic and diastolic pressures rose with age in both sexes, but there was a greater rise in the systolic than the diastolic blood pressures with age"¹². Looking at a graphic representation of the blood pressures of Zulu males in the Seedat study, a steady decline in the diastolic blood pressure from around the age of 50 years becomes evident.



DISCUSSION

Essential hypertension is a serious public health problem in that it contributes considerably to the burden of morbidity and mortality. It is a leading cause of early retirement⁴ and the personal and community problems associated with dependence are well known.

Seedat is of the opinion that mass screening of the population is the major weapon in the fight against hypertension, not only by general practitioners, but also in factories⁹. Myers agrees by stating that his findings indicate the need for improved screening in the workplace for a "problem of considerable magnitude"⁴,

while other researchers warn against overloading an already busy service and of labelling previously asymptomatic people as hypertensive without decreasing their risk⁶.

Saunders et al stress the importance of measuring the blood pressure of all adult patients at the time of the first visit to the polyclinic. They go further, suggesting that blood pressure measurement instructions and techniques be reviewed and the management decision cut-off points within the blood pressure protocol be reconsidered. Methods of dealing with variations in the way in which different nurses measure blood pressure should be introduced⁶. One can only strongly agree with these statements because this is probably the weakest point in carrying out a study on hypertension, considering the human factor which in so many ways renders observations subject to bias. It is the intention to press management at the factory where this study was carried out, to acquire electronic blood pressure measuring apparatus in order to try to obviate most of the problems referred to above. Such an acquisition will be of much value as it is the intention to extend this study further in order to include more subjects from the different ethnic groups eventually.

Poor compliance seems to be a major problem in dealing with the hypertensive patient in the long term⁷. When considering poor compliance a distinction is made between early dropouts and irregular attenders⁶. Poor compliance is considered to be the major factor preventing the polyclinic from reducing morbidity and mortality in hypertensives. Improving compliance should therefore be a major goal of the service⁶. Non-compliant patients had been inadequately informed of their need for medication and follow-up. They had felt better and therefore stopped taking their medicine. Others complained that their medication was too complicated or caused side-effects. An appointment system reducing the patient's wait time is also necessary⁶. Women attend more regularly than men. This may reflect the difficulty that working men have in getting time off to attend the polyclinic⁶. At the factory where this survey was done, most of the factors leading to non-compliance are dealt with successfully. An appointment system is used, whereby hypertensives are told in advance on which date and at what time to return for follow-up. These check-ups are diarised and non-compliers are called back via their foremen. Anxiety due to loss of income while going for treatment is non-existent because all medical activities are carried out during work time and full pay is therefore received. Regimens are kept simple and time is spent to explain their illness and treatment to patients. In addition, patients are advised about ways of reducing blood pressure that do not involve the administration of drugs, eg obese patients are advised about weight reduction⁶.

Because of security measures at a factory refining precious metals, active family involvement in the treatment process under the direct guidance of the nursing and medical staff is not possible.

Hypertension is predominantly an illness of middle age⁴ and essential malignant hypertension shows a peak

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incidence in Black males aged 40 to 50 years³. The percentage of patients with a diastolic blood pressure of 90 mmHg or above rose steeply with age from 15 to 45 years, and then remained relatively constant. It is interesting to note (Fig 1) the actual decline in diastolic blood pressure in the urban Zulu male from more or less the age of 60 years⁸.

Because every worker in the factory where this study was carried out is examined regularly, workers moving into the danger area of 40 to 50 years are monitored.

In this study it was found: BP followed a gradual upward trend with age; a steeper incline from about 50 years.

Something is therefore being done to cope with the problem of "hypertension being a major cause of mortality and morbidity among urban Black South Africans"⁶. One can go even further to state that the conclusion of Saunders et al does not apply in the case of this population when they state that, "in the light of the poor attendance of diagnosed hypertensives, we do not feel it is justifiable to screen for hypertensives in (this) community at present. To introduce anxiety about hypertension without being sure of reducing morbidity and mortality is undesirable"⁶.

Walker expresses concern about the major rises in the incidence of obesity, hypertension and its related diseases and diabetes in the South African Blacks¹⁴. In considering factors that lead up to the hypertensive state, Burkitt feels that environmental factors most likely to be responsible, are dietary¹.

The good response to diuretics rather than beta-adrenergic blocking agents in the treatment of hypertension suggest that salt and volume overload may play an important part in the aetiology of hypertension¹¹. Seedat adds to this that factors found to be significantly associated with hypertension are age, sex, marital status, urbanization and number of dependants, insomnia due to anxiety, tobacco smoking, alcohol intake, conditions of work, educational status, income, number of children not working, lack of recreation or sport activity and overcrowding¹¹. Urbanization should be further qualified in that the prevalence of hypertension in the urban Zulu was related to the duration of stay in the city¹¹.

The main difference between the urban hypertensive and normotensive is that the former is not able to meet or adapt to the demands of urban life¹¹. This now places more accent on stressful conditions, and Myers states that although it is commonly said that essential hypertension is idiopathic, there is increasing evidence that it is a stress-related disease⁴. In the work situation stress has been shown to induce rises in blood pressure. These rises may be transient initially, but in the long term may be sustained. Both overload and underload of stimuli in the work situation can have the same

endocrinological effects as stressful situations, causing rises in the levels of pressor amines. With particularly stressful work, the rises are higher and do not decline to the normal baseline by the end of the shift. In addition, there is evidence that unskilled and semi-skilled workers experience more stress at work than either white collar workers or managerial personnel, emphasizing the need for further research into the association between hypertension, other stress-related illnesses, and the work situation⁴. The morbidity and mortality burden could therefore be much reduced by more accessible therapy and paying more attention to the reduction of stress factors at work,⁴ which now moves a major part of the problem of hypertension into the occupational medical field. Myers expands his thinking by stating that findings would tend to favour an association between occupational social class and hypertension rather than one between ethnicity and hypertension; this is in keeping with findings in the USA to the effect that social stress is more important than genetics in the relationship between ethnicity and blood pressure⁴.

Seedat considers it most desirable to have more effective screening programmes for the detection of hypertension among Blacks and equally desirable to have an effective therapeutic programme⁵. These views are shared by Gold, who places his emphasis on the young Black male³. The cost of this type of programme is considerable⁹. Cost and lack of manpower problems are probably responsible for the fact that health services for urban Blacks as offered by polyclinics and out-patient departments run by provincial hospitals are already over-crowded with patients and a lot of time is wasted as patients have to wait to be attended to.

"I felt better, so I stopped taking the medicine".

To achieve a substantial decrease in morbidity and mortality from hypertension in a community, several steps are necessary, namely

1. many hypertensives in the community must come into contact with the health services,
2. their blood pressures must be measured,
3. readings must be accurate,
4. appropriate treatments must be instituted,
5. patients with hypertension must continue to attend,
6. hypertensive patients must comply with treatment, and
7. hypertensive patients' blood pressures must be reduced⁶.

It follows that efficient therapeutic programmes must therefore precede mass screening, more so when taking into account the four criteria laid down by the WHO before mass screening programmes are launched, namely that:

1. therapy must be effective,
2. available health services must be sufficient to provide long term care for those in whom screening is positive,
3. compliance among asymptomatic patients in whom early diagnosis is made, must be at a level demonstrated to be effective in improving health, and
4. the disease must be serious⁷.