Original article

Risk factors for essential hypertension in a high density town near Harare, Zimbabwe: A pilot study

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Abstract: A case control pilot study was designed to suggest probable risk factors associated with essential hypertension in a high density town near Harare, Zimbabwe. Fifty cases who were on treatment for hypertension at a clinic were systematically selected from a register of chronic diseases and 50 neighbourhood controls stratified by gender were selected from the community. Eighty six percent of participants were females. Statistically significantly elevated Odds Ratios (ORs) and 95% Confidence Intervals (CIs) were noted for age above 40 years, 8.22(1.90-35.64); not married, 18.31(3.57-93.89); body mass index (BMI) of more than 25 kg/m^2, 4.74(1.30-17.29); employed, 12.91(1.97-84.47); having more than four dependents, 5.38(1.29-22.56); and marital conflicts, 11.21(2.24-56.23). Most of our findings support previous findings. Of interest is the finding that suggests a probable association between having to look after four or more dependents and hypertension. Further studies to confirm this association are required before mechanisms of control/treatment can be considered.[*Ethiop. J. Health Dev.* 1998;12(1):57-61]

Introduction

Essential hypertension is a major risk factor for cardiovascular disease. Cardiovascular disease is the main cause of death in virtually all industrialized countries (1). In Harare, Zimbabwe, hypertension was the number two, four and ten as a cause of death in the 65 years or more, 45 to 64 years and 25 to 44 years age groups, respectively, in 1995 #(2). The limited information available from developing countries suggests that a similar epidemic that has occurred in developed countries is inevitable to occur in developing countries if current trends go unchecked (3). Its control by positive changes in factors associated with it, is of vital importance in reducing cardiovascular morbidity and mortality. Thus, the identification of factors associated with hypertension is a major public health objective.

Kaufman and Barkey (4) in their review on risk factors for hypertension, list *Sodium chloride*, potassium, stress, educational level, social support, body mass index (BMI) and alcohol as factors associated with hypertension. Other factors reported elsewhere associated with hypertension include positive family history of hypertension (5) and advancing age (6). It is clear that many studies have been done on hypertension in industrialized countries and in southern Africa within the Republic of South Africa but, in general, studies on risk factors for hypertension have yielded varied findings because of different designs and methodologies used in these studies. A World Health Organization Expert Committee on hypertension control reported that risk factors should continue to be monitored and that each country needs to develop an epidemiological data base of the frequency of various factors contributing to the risk of developing hypertension (7). Because little has been published about the risk factors for hypertension in our setting, we decided to conduct a case control pilot study in order to suggest

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probable risk factors associated with essential hypertension in a high density town near, Harare, Zimbabwe.

Methods

Study Population: The description of the study population is reported elsewhere (8). The study population was relatively young with 62% of male and 60% of female inhabitants aged 15 yeas or more (1992 census). In two cross-sectional population-based studies conducted by Watts and Siziya (submitted for publication) in the same study area, diastolic blood pressure of above 99 mmHg was observed in 7.9% and 5.4% of male and 10.3% and 6.4% of female respondents in 1990 and 1993, respectively.

Sources of subjects: Cases: Hypertension status was determined according to the current use of anti-hypertensive medication. A list of cases of hypertension was obtained from a chronic disease register from a clinic that served the study population. Out of 456 people with chronic disease, there were 388(85.1%) people with hypertension, out of whom 50 cases were systematically selected.

Controls: Because the cases were selected to represent affected individuals in our study population, the general population was used as the source of controls. For each case a nearest neighbourhood (9) person of the same gender and aged above 20 years as the case was considered as a control if he or she was not on antihypertensive therapy or had a systolic blood pressure of less than 140 mmHg and a diastolic blood pressure of less than 90 mmHg (10). Blood pressure readings were taken in a seated position using a cuff, sphygmomano-meter and stethoscope by three fourth year medical students in order to ascertain the controls.

Body mass: Height and weight were measured using an insulation tape placed against a wall and a bathroom scale, respectively. The body mass index (BMI) was used as an indicator for fatness and not the Ponderal Index (PI) because BMI was less correlated with height (r=-0.35; 95% Confidence Interval (CI)=-0.51 to -0.16; F-statistic = 13.63) than PI was with height (r= -0.53; 95% CI =-0.66 to -0.37; F-statistic =38.01), and more correlated with weight (r=0.86; 95%CI = 0.80 to 0.90; F-statistic = 276.03) than PI was with weight (r=0.74; 95%CI 0.63 to 0.81; F-statistic = 115.76). An acceptable weight-for-height index should be less correlated with height and more correlated with weight (11).

Statistical analysis: The Chi-square test and the Fisher's exact test were used to test for an association between a factor and an outcome where appropriate. The Student's t test was used to compare means when variances were assumed to be equal and the variable being Normally distributed. In the case of variances being significantly different or the variable being not Normally distributed, the Kruskal-Wallis (H) test was used. The F test was used to test the significance of the correlation coefficients. Significant factors were further analyzed using multiple logistic regression in STATA (12). A cut off point of 5% was considered for statistical significance.

Results

Eighty six percent of the participants were females. None of the males was married compared to 29.1% of the females (Fisher's exact test, P=0.019). Males were significantly older than females (mean age 55.0 (standard deviation (SD)12.0) vs 45.6 (SD 10.9) years, respectively; P=0.004). Females had significantly higher BMI values than males (mean BMI 28.0 (SD 5.54) vs 24.1 (SD 3.47)kg/m^2 respectively; t=2.57, df=98p= 0.011).

Table 1: **Factors considered in the analysis.**

1.	Age
2.	Gender
3.	Marital status
4.	Education
5.	Body mass index
6.	Employment
7.	Number of dependents
8.	Number of children attending primary school
9.	Ownership of house

10.	History of major illness
11.	Divorce
12.	Infertility
13.	Conflicts in Marriage
14.	Inadequate income
15.	Smoking
16.	Adding salt to food at the table
17.	Family history of hypertension
18.	Hypertension in pregnancy

Table 1 shows the factors considered in the analysis, and Table 2 shows the Odds Ratios (ORs) adjusted for gender only and those adjusted for all the factors in the model. The precision of the ORs for models with only gender adjusted were better than the precision in the model adjusted for all significant variables. The confidence widths in the final model were more than twice the width in the gender adjusted models. Apart from the factors "BMI" and "Dependents" whose ORs were almost unchanged, the ORs for the rest of the factors either doubled or more than doubled.

Table 2: **Odds Ratios adjusted for gender only and those adjusted for all the factors in the model.**

Factor	Stratified by gender only OR (95%CI)	Adjusted for all factors in the model OR (95%CI)
Age (40+ Years)	4.63(1.79	8.22(1.90
Marital status (not married)	3.70(1.35	18.31(3.57
BMI (25+kg/m^2)	3.94(1.64	4.74(1.30
Employment (employed)	5.59(1.47	12.91(1.97
Inadequate income	4.10(1.23	
Dependents(4+total)	3.94(1.57	5.38(1.29
No one attending Primary school	3.65(1.57	
No death of close Relative	2.98(1.31	7.97(2.15
Marital conflicts	4.35(1.44	11.21(2.24
Family history of Hypertension	4.87(1.90	

Statistically significantly elevated Odds Ratio, OR(95%CI), were noted for age above 40 years, 8.22(1.90 to 35.64); not married, 18.31(3.57 to 93.89); (BMI) of more than 25 kg/m^2 4.74(1.30 to 17.29); employed, 12.91(1.97 to 84.47); having more than four dependents, 5.38(1.29 to 22.56); and marital conflicts, 11.21(2.24 to 56.23).

Discussion

Associations of life events and illness are prone to errors in retrospective studies because recall of events may be more complete among people who are seeking an explanation of their ill health (13). Family history of hypertension was most likely underestimated probably due to incomplete knowledge of hypertension and greater likelihood of undiagnosed hypertension. However, there is no reason to assume that this should bias the findings on associations of life events and hypertension. Furthermore, a previous study examining the validity of self reported data for hypertension has concluded that self reported data are valid as predictors of risk, with a high level of agreement noted between self-reported status and information contained in medical records (14). Also self- reported risk factors were found to be significant predictors of hypertension in the multivariate analysis, consistent with findings from previous studies in which direct measurements were made (15).

The over representation of females of 86% in the current study was probably due to the fact that women visit clinics much more frequently than men and that hypertension is known to be more common in women over the age of 40 years than in men (16). In one Saudi study, 65% of the

hypertensive patients studied were females (16). In another UK study, (17) two thirds of the hypertensive patients were women and in yet another UK study, 60% were women (18).

The dropping out in the full model of such factors as "inadequate income", "number of children attending primary school" and "family history of hypertension" which were significant in stratified analysis by gender only, suggests that many of the lifestyle factors which are related to hypertension are mutually dependent. The wider confidence intervals in the final model suggests that much of the variability in essential hypertension was not accounted for by the factors considered in the current study.

Age: The finding that age is associated with essential hypertension in the current study agrees with almost every reported study of the distribution of hypertension in which blood pressure levels were observed to increase with age. Notable to quote is the study done by Siziya, Marufu and MatchabaHove (8) in the same study area and that of Johnson (19) among Lagos, Nigeria, residents. Another study worth quoting is that of Miall and Oldham (20) who showed that blood pressure rose with age and that, after the age of 40 yeas, the rise in systolic was faster in women than men. This finding has not been universal as some observers have found no increase in mean blood pressure with age, for example, among the Kenyan Africans (19). These findings suggest further studies.

Marital status: Unmarried (divorced/ separated, single, widowed) persons were significantly associated with hypertension in our study. This finding supports that of Scotch et al (21) who found higher rates of hypertension among widowed and separated urban Zulu women.

Body mass index: The positive association between body mass index (BMI) and hypertension is well established. Considering a cut off point of 25 kg/m^2 for obesity, the present investigation confirms previous studies (22-27) conducted in sub-Saharan Africa by demonstrating that BMI is associated with hypertension.

Employment: Employment in the current study was classified into employed or not employed. We, however, did not enquire on how long the subjects were unemployed. Those who were employed were more likely to have had essential hypertension. Considering only the employed, Seftel et al (28) studying blood pressure levels in Johannesburg blacks classified occupation into three groups: the unskilled, the semi-skilled and skilled and observed virtually no relationship between blood pressure and occupation.

Dependents: Since essential hypertension is a common clinical condition, a case control design is not a preferred design to establish its risk factors. The purported new finding of the number of dependents as a risk factor for hypertension in our case control pilot study only suggests a probable association between the number of dependents and hypertension. Further studies to confirm this association are required before mechanisms can be considered.

Marital conflicts: The responses on conflicts in marriage were subjective. The main study should consider more accurate definitions and quantitation. Hypertension can result from repressing conflicts between feelings of anger and the need to be submissive (29). This theory is supported by the finding in the current study, despite its subjectivity in definition of marital conflicts, that having marital conflicts is associated with essential hypertension.

In conclusion, factors that may cause stress considered in the present study when examined for association with essential hypertension have yielded inconsistent findings. The subjective measures of stress considered in the current study may explain, in part, the observed inconsistent findings. Most of our findings support previous findings. This study suggests a probable new finding, at least in our setting, that the number of dependents is associated with essential hypertension. Further studies are required to confirm this finding.

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