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Prevalence and Correlates of Hypertension among Adults Aged 25 Years or Older in a Mining Town of Kitwe, Zambia

Seter Siziya^{1*}, Emmanuel Rudatsikira², Olusegun Babaniyi³, Peter Songolo³, David Mulenga¹ and Adamson S Muula⁴

¹Department of Clinical Sciences, Public Health Unit, Copperbelt University, Ndola, Zambia ²School of Health Professions, Andrews University, Berrien Springs, Michigan, United States ³World Health Organization Country Office, Lusaka, Zambia

⁴Department of Community Health, University of Malawi, College of Medicine, Blantyre, Malawi

Abstract

Background: Hypertension is a major risk factor for cardiovascular disease. The trend towards a higher burden of non-communicable chronic diseases in developing countries is of great concern as it adds to the burden of communicable diseases. The aim of this study was to estimate the prevalence and correlates of hypertension among adults in the City of Kitwe, Zambia.

Methods: A modified WHO STEPs (STEPwise Approach to Surveillance) method was used to collect data through a community-based survey among persons aged 25 years or older living in urban Kitwe, Zambia. Prevalence of hypertension was estimated and compared between males and females. Odds ratio (OR) and adjusted odds ratio (AOR) and their 95% confidence intervals were used to establish associations between exposure factors and hypertension.

Results: Altogether, 1627 persons participated in the survey of which 57.7% were females. Overall, 32.3% (33.5% of males and 31.1% of females, p=0.350) were hypertensive. Age and body mass index were significantly associated with hypertension. Compared to participants who were of age 45 years or older, participants who were below the age of 45 years were less likely to have hypertension (AOR=0.53, 95% CI [0.45, 0.62]) for 25-34 years age group, and AOR=0.61, 95% CI [0.50, 0.74]) for 35-44 years age group). Participants who had BMI of less than 18.5 kg/m² were 50% (AOR=0.50, 95% CI [0.32, 0.77]) less likely to have hypertension compared to participants who had BMI of 30 kg/m² or more. Meanwhile, participants who had BMI of 25.0-29.9 kg/m² were 33% (AOR=1.33, 95% CI [1.05, 1.69] more likely to have hypertension compared to participants who had BMI of 30 kg/m² or more.

Conclusions: Our findings indicate that hypertension is prevalent among urban residents in Kitwe, Zambia. Effective prevention strategies including interventions to ensure lower BMIs, should be implemented, taking into considerations the risk factors identified in this study.

Keywords: Hypertension; Prevalence; Correlates; Mining town; Kitwe; Zambia

Introduction

Hypertension is prevalent all around the world; one in three adults lives with hypertension [1]. Hypertension is a major risk factor for cardiovascular disease [2], which is the leading cause of death among older Africans. The burden of cardiovascular disease is estimated to be twice as high in 2020 as it was in 1999 with severe negative impact on the economic development in many ways, including the high cost of treatment, limited productivity and increase in inequalities [3,4]. Noncommunicable chronic diseases (NCDs) impose a heavy burden in sub-Saharan Africa in addition to communicable diseases [5].

Risk factors for hypertension include increasing age [6-8], low education [9,10], obesity [11], sedentary lifestyle [12], family history [13], smoking [14], alcohol use [15] and diet [16]. The trend toward a higher burden of chronic diseases in low income countries is of great concern as it adds to the burden of infectious diseases. The aim of this study was to estimate the prevalence and correlates of hypertension among adults aged 25 years or older in the City of Kitwe, Zambia. Knowledge of the burden of hypertension may contribute to general awareness of the problem, but also inform the design and implementation of public health interventions and healthcare services.

Methods

Details of the methods that were used in the survey are similar to those described for Lusaka and reported by Goma et al. [11], Nsakashalo-Senkwe et al. [17] and Siziya et al. [18]. We highlight briefly the methods that were used in the survey below.

Setting and design

The study was conducted in Kitwe district in Copperbelt province of Zambia. A cross sectional study using a modified World Health Organization (WHO) global NCD surveillance initiative, NCD-STEPwise approach STEPs 1 and 2, was used in the study [19]. The WHO STEPwise approach is a standardized population-based survey of adults aged 25-64 years that estimates prevalence rates and correlates for chronic diseases. The STEPs questionnaire has three sections arranged in a stepwise order. The first step covers behavioral factors, the second covers physical measurements and the third step covers biochemical measurements. WHO recommends that most countries undertake steps 1 and 2. Steps 1 through to 3 are recommended for well-resourced countries.

*Corresponding author: Seter Siziya, Department of Clinical Sciences, Public Health Unit, Copperbelt University, Ndola, Zambia, Tel: +260955752646; Fax: +260212618511; E-mail: ssiziya@gmail.com

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Sample size and sampling

A sample size of 1620 was determined using a prevalence rate of 50 \pm 5%, a design effect of 2, a 95% response rate; and assuming an infinitely large population to sample from. A multi-stage sampling technique was used to sample the participants. Kitwe was divided in five constituencies (two comprising high costs residential areas, and three low cost residential areas). Firstly, we randomly selected one out of the two high cost residential areas, and also selected two out of the three low cost residential areas. Secondly, from each selected constituency 1 ward was selected. Thirdly, we selected six Census Supervisory Areas (CSAs) from the low cost residential areas, and four CSAs from the high cost residential area. Fourthly, one Standared Enumeration Area (SEA) was selected from each CSA. In total 10 SEAs were selected for the study. SEAs were selected using a systematic random sampling method. Finally from the selected SEAs, households were systematically sampled. All individuals (male or female) aged 25 years or older in a selected household were eligible to participate in the study. If a selected household did not have an eligible person, it was not replaced. Interviewers moved to the next household that was originally sampled.

Data Collection

Interviews

An interview schedule was used to collect some data from the interviewees. The questionnaire was divided into the following sections among others: demographic information, tobacco use, alcohol consumption, sedentary behaviour, and history of raised blood pressure. Biological measurements (Height and Weight, Waist, Blood pressure, Hip circumference and Heart rate) were measured by trained research staff.

Measurements

We used the WHO STEPwise method [19] of showing cards to explain the meaning of some of the terms in obtaining the measurements.

Blood pressure

The Omron Digital Automatic BP Monitor M4-1 (OMRON Healthcare Europe BV, The Netherlands) was used to measure the blood pressure of the participants. Participants rested for three minutes in between three successive readings of blood pressure. An average of the three readings was considered the final reading for blood pressure [11].

Height

Height was measured in centimeters without the participant wearing foot or head gear. The Seca Brand 214 Portable Stadiometer (Secagmbh & Co. kg Hamburg, German) was used to measure the height.

Weight

Weight was measured in kilograms using the Heine Portable Professional Adult Scale 737 (Secagmbh & Co. kg Humburg, German). Participants were asked to stand still, face forward, and place arms on the sides of the body.

Waist circumference

The measurement for waist circumference was taken in a private area using a Figure Finder Tape Measure. The tape measure was wrapped around the waist at the midpoint between the inferior margin of the last rib and the crest of the iliac, and the measurement was recorded in centimeters.

Hip circumference

The measurement for hip circumference was taken in a private area using the Figure Finder Tape Measure, and was recorded in centimeters. The tape measure was placed over the buttocks at the maximum circumference.

Heart rate

The heart rate was recorded using the ORMRON digital automatic blood pressure monitor M4-1 (OMRON Healthcare Europe BV, The Netherlands).

Data Management

Two data entry clerks were trained to enter the data using Epi Data software. Data were double entered and validated. The data entry template had consistency and range checks embedded in it. The validated data was exported to SPSS version 11.5 for analysis.

Definitions

Body mass Index (BMI) was categorized as <18.5 (underweight), 18.5-24.9 (normal weight), 25.0-29.9 (overweight), and 30+ (obese); waist-hip ratios was grouped into two: < 1 (normal) and >1 (raised); blood pressure of more than 140/90 was considered to indicate hypertension. Participants who were on antihypertensive medication were also included in the high blood pressure group [18].

Data Analysis

Proportions of the outcome variables and socio-demographic variables were calculated. Bivariate and multivariate logistic regression analyses were conducted. Proportions were compared using the Yates' corrected Chi-square test, and a result yielding a p value of less than 5% was considered statistically significant. Factors that were statistically significantly associated with the outcome on bivariate analyses were considered in a multivariate logistic regression analysis using a backward variable selection method. Odds ratios (unadjusted odds ratios – OR, and adjusted odds ratios – AOR) and their 95% confidence intervals are reported.

Ethical Considerations

The study protocol was reviewed by the University of Zambia (UNZA) Biomedical Research Ethics Committee (BREC). Consent was obtained after the interviewer explained among others the purpose of the study, benefits and risks for taking part in the study to the eligible participants. The basic and operational principles of the Helsinki declaration on ethics in research were adhered to in our study. Entry forms were viewed only by approved study personnel.

Results

Altogether, 1627 persons participated in the survey of which 57.7% were females. About half (55.9%) of the participants were aged below 35 years. Male participants tended to have higher education levels than their female counterparts with 32.1% of males compared to 15.3% of females having attained college or university level of education. Overall, 32.3% (33.5% of males and 31.1% of females, p=0.350) were hypertensive. These results are shown in Table 1.

Table 2 shows factors associated with hypertension in bivariate

	Total	Male	Female
Factor	n (%)	n (%)	n (%)
Age group (years)			
25-34	905 (55.9)	387 (56.8)	512 (55.4)
35-44	347 (21.4)	127 (18.6)	219 (23.7)
45+	366 (22.6)	167 (24.5)	193 (20.9)
Sex			
Male	682 (42.3)	-	-
Female	932 (57.7)	-	-
Education			
None	79 (4.9)	22 (3.3)	56 (6.0)
Primary	505 (31.2)	160 (23.7)	339 (36.5)
Secondary	675 (41.5)	277 (41.0)	393 (42.3)
College/university	360 (22.2)	217 (32.1)	142 (15.3)
Hypertension			
Yes	504 (32.3)	226 (33.5)	271 (31.1)
No	1055 (67.7)	449 (66.5)	600 (68.9)

NB: numbers may not add up due to missing information

analyses. Only age, education, and body mass index were significantly associated with hypertension.

Age and body mass index remained significantly associated with hypertension in a multivariate analysis. Compared to participants who were of age 45 years or older, participants who were below the age of 45 years were less likely to have hypertension (AOR=0.53, 95% CI [0.45, 0.62]) for 25-34 years age group, and AOR=0.61, 95% CI [0.50, 0.74]) for 35-44 years age group). Participants who had BMI of less than 18.5 kg/m² were 50% (AOR=0.50, 95% CI [0.32, 0.77]) less likely to have hypertension compared to participants who had BMI of 30 kg/m² or more. Meanwhile, participants who had BMI of 25.0-29.9 kg/m² were 33% (AOR=1.33, 95% CI [1.05, 1.69] more likely to have hypertension compared to participants who had BMI of 30 kg/m² or more. Alcohol, reported sedentary lifestyle and smoking were not found to be associated with high blood pressure.

Overall, 279 (55.4%) out of 504 participants (81/226 or 35.8% of males and 198/271 or 70.1% of females) who were found to be hypertensive during the survey were previously informed by a doctor or health worker that they had raised blood pressure. Currently, 38.5% of the participants were taking drugs for hypertension, 35.7% were advised to reduce salt intake, 19.7% were advised or given treatment to lose weight, and 29.7% were advised to start or do more exercises (Table 3). The proportions of males and females receiving treatments or advice for hypertension were not significantly different.

Discussion

In a community-based study of hypertension among adults living in Kitwe, Zambia, we found that about 1 in 3 residents (31.8%) had hypertension. This prevalence of hypertension is higher than 22% reported by Muhihi et al. [8] in Uganda and 23.7% reported by Muhihi et al. [19] in Tanzania. The difference between our finding and that of Muhihi and colleagues may partly be due to the fact the study by Muhihi and colleagues was conducted in a rural area, while our study was conducted in an urban area. Sedentary lifestyles, a risk factor for hypertension [20] is more likely to be prevalent in urban than rural areas. That cannot be the case for the Muhihi et al. study since it was conducted in the City of Mwanza. The difference between our finding and that of Muhihi and colleagues may partly be due to cultural background such as diet differences.

Factor	OR (95% CI)
Age group (years)	
25-34	0.49 (0.42, 0.57)
35-44	0.65 (0.54, 0.78)
45+	1
Sex	
Male	1.06 (0.95, 1.18)
Female	1
Education	
None	2.11 (1.49, 2.99)
Primary	0.99 (0.82, 1.20)
Secondary	0.56 (0.46, 0.68)
College/university	1
Time usually spent sitting or reclining on a typical day (hours)	
<1.5	1.07 (0.90, 1.29)
1.5-3.4	0.89 (0.76, 1.03)
3.5+	1
Body mass index (kg/m²)	
<18.5	0.49 (0.32, 0.74)
18.5-24.9	0.75 (0.61, 0.91)
25.0-29.9	1.38 (1.11, 1.72)
30+	1
Alcohol consumption	
Yes	1.16 (0.90, 1.48)
No	1
Cigarette smoking	
Yes	1.06 (0.88, 1.27)
No	1
Waist-Hip ratio	
≤ 1	0.75 (0.55, 1.04)
> 1	1
Heart rate (beats per minute)	
<60	0.99 (0.66, 1.50)
60-90	0.97 (0.77, 1.23)
>90	1

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OR Odds ratio; CI Confidence interval

 Table 2: Factors associated with hypertension in bivariate analyses in Kitwe, Zambia.

	Total	Male	Female
Factor	n (%)	n (%)	n (%)
Took drugs in past 2 weeks			
Yes	107 (38.5)	33 (40.7)	74 (37.6)
No	171 (61.5)	48 (59.3)	123 (62.4)
Advice to reduce salt intake			
Yes	99 (35.7)	31 (38.3)	68 (34.7)
No	178 (64.3)	50 (61.7)	128 (65.3)
Advice or treatment to lose weight			
Yes	55 (19.7)	13 (16.0)	42 (21.2)
No	224 (80.3)	68 (84.0)	156 (78.8)
Advice to start or do more exercises			
Yes	82 (29.7)	27 (33.8)	55 (28.1)
No	194 (70.3)	53 (66.3)	141 (71.9)

NB: numbers may not add up due to missing information

 Table 3: Treatment/advice given to participants for high blood pressure between sexes in Kitwe, Zambia.

In this study, there was no significant gender difference in the prevalence of hypertension. This finding is inconsistent with findings from another urban setting in Zambia, namely Lusaka, the capital city, where Goma et al. [11] found that males were more likely to have hypertension than females. In Tanzania, Njelekela et al. [21] found that males were more at risk of hypertension than females, while Wamala et al. [22] reported the opposite from Uganda. The finding in Tanzania that females were less likely to have hypertension than males may partly be due to females having tended to have higher physical activity than males [21]. Meanwhile in Uganda, Bimenya et al. [23] have reported that many people in Uganda tended to adopt "western type" diet and sedentary life styles that facilitate fat accumulation. The diet and sedentary life styles may have different effects in males and females such that a greater degree of adiposity may be achieved in females than males that may in turn lead to higher rates of hypertension in females than males.

That increasing age was positively associated with high blood pressure is consistent with findings from previous studies from other sub-Saharan African countries such as Sierra Leone [6], Ethiopia [7], Uganda [8], and Cameroon [24]. Increasing age is a recognized risk factor for hypertension, affecting approximately 70% of those over 65 years of age [25].

Participants who had BMI of less than 25 were less likely to have hypertension than those who had BMI of 30 or more, which is consistent with previous studies that have reported a strong association between hypertension and BMI [11,26]. However, we found that participants with overweight BMIs had higher prevalence of hypertension than participants with obese BMI. It is likely that obese people may seek medical attention in order to control their obesity, and in turn reduce their chances of being hypertensive. In Malawi, women perceived large body shapes as a sign of being healthy [27], and if the same perception prevailed in our study then overweight people may have perceived overweight as not a problem and would not have adopted life styles to enable them lose weight that might have lead to hypertension.

In Bivariate analysis, participants with no formal education were more than twice likely to have hypertension than those who had college/ university level education. Previous studies have reported the positive relationship between hypertension and low education [9,10]. Such association may be due to lack of awareness of risk factors of hypertension [28], improper diet, and lack of access to medical care [10].

We found no association between alcohol, smoking and sedentary life style on one hand and hypertension on the other. Previous studies have reported a differential effect of alcohol drinking depending on drinking patterns with a protective effect of moderate consumption and exacerbating effect of abuse of alcohol [29-31]. The reasons for the lack of association are unclear to us, but could include misclassification of these variables. Another explanation could be the doses of these exposures which may not be enough to be associated with hypertension.

We found that 70.1% of females and to 35.8% of males were informed that they were hypertensive by a doctor or other health worker. Females have more access to health services through attending antenatal care and other services than males have. However, both sexes were accorded equal access to treatment for hypertension.

Limitations

This study has several limitations. The cross sectional nature precludes the ability to ascribe causation. Secondly, some of the data

such as education level and age were self-reported. To the extent that the study participants may have misreported, our findings may be biased. We also did not evaluate other risk factors for hypertension such as psychosocial stress that are known to be associated with hypertension [32,33]. We also used unweighted analysis because we were unable to compute weights because we did not obtain information to enable us to compute response rates.

Conclusions

Our findings indicate that hypertension is prevalent among urban residents in Kitwe, Zambia. Effective prevention strategies should be implemented, taking into considerations the risk factors identified in this study.

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