ORIGINAL ARTICLE

Prevalence of Hypertension Among Women of Child Bearing Age in Zambia

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ABSTRACT

Hypertensive disorders of pregnancy account for 12 to 20 percent of the total maternal deaths in the world. Some of these disorders are precipitated by pre-existing chronic hypertension of which many women may not necessarily be aware.

The objective of this study was to examine the prevalence of hypertension among women of child-bearing age in Zambia. It was a cross-sectional study performed in an urban clinic in Lusaka and a rural clinic in Chibombo, Zambia. The study utilized the WHO STEP survey for Non-Communicable Diseases (NCDs) which measured 1) blood pressure and 2) risk factors for hypertension among non-pregnant women who came for their gynecological visit. 243 women between the ages of 18 to 45 years participated.

Results showed that 18.6% of women were hypertensive in Lusaka and 6.7% in Chibombo. Among all risk factors examined, only BMI was significantly associated with hypertension.

INTRODUCTION

Hypertensive disorders are the most common medical problems encountered during pregnancy and account for 12 to 20 percent of the total maternal deaths in the world[14]. Hypertension, body mass index (BMI), age, and unfavorable levels of total cholesterol, low-density lipoprotein cholesterol, and triglycerides are risk factors for the development of these disorders[3]. The disorders are classified into 4 categories: 1) Chronic hypertension, 2) Preeclampsia-eclampsia, 3) preeclampsia superimposed on chronic hypertension, and 4) gestational hypertension (transient hypertension of pregnancy or chronic hypertension identified in the latter half of pregnancy[1]. Hypertension is defined as a blood pressure equal to or greater than 140 mm Hg systolic or 90 mm Hg diastolic. Hypertension that is diagnosed for the first time during pregnancy and that does not resolve after pregnancy is also classified as chronic hypertension. Typically, chronic hypertension is defined as hypertension that is present before pregnancy or that is diagnosed before the 20th week of gestation. Preeclampsia will develop in 20-25% of those with chronic hypertension during pregnancy[1]. Preeclampsia is diagnosed when a woman who was normotensive before 20 weeks' gestation presents with a systolic blood pressure (SBP) greater than 140 mm Hg and a diastolic BP (DBP) greater than 90 mm Hg on 2 successive measurements, 4-6 hours apart. Preeclampsia in a patient with preexisting essential hypertension is diagnosed if SBP has increased by 30 mm Hg or if DBP has increased by 15 mm Hg. The blood pressure changes are usually accompanied by proteinuria of 2.0g or more in 24 hours, changes in creatinine, liver enzymes, and symptoms of blurry vision, headache and epigatric pain. Eclampsia is the occurrence of seizures In a woman with preeclampsia. Preeclampsia superimposed on chronic hypertension manifests as a sudden increase in proteinuria and blood pressure before 20 weeks in a woman with previously diagnosed and controlled chronic hypertension. Lastly, gestational hypertension is seen in the

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woman who has blood pressure elevation for the first time after mid pregnancy, but does not have accompanying proteinuria [1].

In a study at the University Teaching Hospital in Lusaka Zambia in 1982-1983, 60 maternal deaths occurred during pregnancy or within 42 days after pregnancy termination. Twelve of these deaths were caused by hypertensive disorders of pregnancy, which is approximately 20% of all the maternal deaths at that time[2]. Limited data describing the causes of these hypertensive disorders are available in developing countries such as Zambia. Nonetheless, research conducted throughout the world suggests that the contributing factors remain the same as those described in more developed countries.

The adoption of western lifestyles by people in developing countries is said to have led to a sharp rise in the incidence of hypertension[14]. Uncontrolled hypertension is a risk factor for multiple other comorbidities and will result in significant economic costs in developing countries in addition to the burden of other diseases such as Acquired Immune Deficiency Syndrome (AIDS), malaria and tuberculosis (TB) in the future.

Chronic hypertension is diagnosed when two or more diastolic blood pressure (BP) measurements are 90 or above on at least two subsequent visits or when the average of multiple systolic BP readings on two or more subsequent visits is consistently 140 mm Hg or above. Isolated systolic hypertension is defined as systolic BP $\geq$140 mm Hg and diastolic BP $\leq$90 mm Hg[5]. Risk factors of hypertension include obesity, insulin resistance, high alcohol intake, high salt intake, age and sedentary lifestyle, stress, and diet[6]. Furthermore, many of these factors are additive, such as obesity and alcohol intake.

Chronic hypertension and pregnancy can become a dangerous combination for health if they are not managed appropriately. During normal pregnancy, blood pressure falls at the end of the first trimester and then increases to pre-pregnancy values in the 3rd trimester[6]. Among some patients with chronic hypertension, blood pressure elevations are associated with an increased risk of stroke and other complications. These complications include prematurity or small for gestational age babies because of compromised development of the placenta and resultant impaired fetal growth [6]. A longitudinal cohort study of females with chronic hypertension was conducted between 1987 and 1991 in Montreal, Quebec, Canada. Of the 298 women studied, 34.4% had premature delivery, 0.045% had perinatal mortality, 21.2% had preeclampsia and 15.5% had small-for-gestational-age newborns[7].

Primary prevention of hypertension is recognized as the most effective way to reduce disease burden and relates to the ability to control the causal risk factors[13]. If hypertension and/or its risk factors are discovered early during the child-bearing years in Zambia and treated, maternal morbidity and mortality can be substantially reduced. This study seeks to address chronic hypertension as a risk factor for the development of hypertensive disease of pregnancy in Zambia, and examine factors associated with this condition including urban-rural differences.

Methods

The WHO STEPs survey was administered during regular scheduled gynecological visits at the Department of Gynecology at the University Teaching Hospital, Lusaka City and at Liteta Hospital, Chibombo District. The WHO STEPs survey instrument for non-communicable diseases was in English, but was administered by a multilingual nurse who was proficient in multiple local languages if translation was needed. Pregnant women were excluded from the study. Reason for the gynecological visit was noted. Written consent was sought after a detailed explanation of the study aims and objectives. Confidentiality was guaranteed and those who declined participation in the study were assured that there were no repercussions.

Overall, 150 women in urban hospital and 104 women in rural hospital between the ages of 18-45 years who came to the hospitals for routine gynecological visits were invited to complete the WHO STEP survey along with a nurse and have their blood pressure, weight, and height recorded[8]. The study was conducted in two steps. Step 1 involved administering a questionnaire which collected demographic and related information, while Step 2 involved taking of the measurements.

The survey focuses on risk factor surveillance and reduction of non-communicable diseases. Risk factors targeted by STEPS approach have been chosen because they are measurable and modifiable. Evidence indicates that reducing these risk factors is feasible and would have a major impact on the disease outcomes. The STEPS Approach is based on sequential levels of surveillance of different aspects of non communicable diseases. STEP 1 consists of questions on tobacco and alcohol use, dietary and physical activity patterns. STEP 2 adds measurement of blood pressure. STEP 3 requires blood collection for the estimation of blood sugar and cholesterol levels. STEP 3 was not used in this study.

Weight was measured with a digital scale and was rounded to the nearest 1kg. Height was measured in cm with wall marked measurements that were made by a tape measure. Height was measured to the nearest 1 cm. BMI was defined as weight (kg)/height $(cm)^2$. BP was measured using a manual cuff and measured only one time during encounter. As defined by WHO STEP manual. Hypertension was defined as 140/90 or greater. Groups were divided into two groups – one with BMI $\leq$25 and the second with BMI >25. Participants with BMI above 25 were defined as being at risk.

A copy of the measurements was recorded on a sheet of paper for participants to report to the physician with whom they had an appointment for that visit. Data were simultaneously entered and analyzed using SPSS version 18.

RESULTS

The demographic characteristics of the participants are detailed in Table 1. Compared to participants at the rural hospital, those at the urban hospital were slightly older (30.1 vs. 29.8 years), had more years of education (8.6 vs. 7.9 years), higher BMI (23.6 vs. 22.5), higher systolic (126.8 vs. 113.1) and diastolic blood pressure (77.0 vs. 68.3).

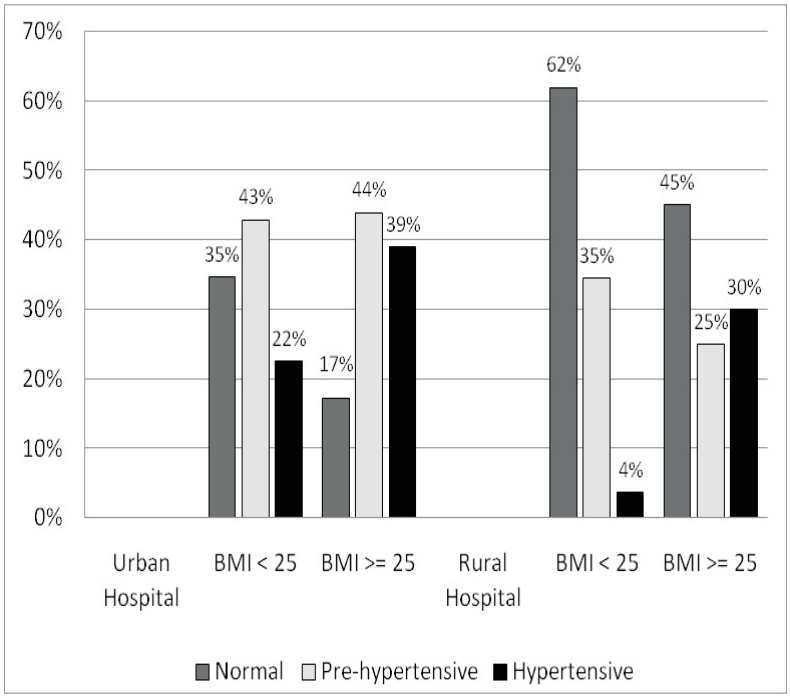
Table 1. *Descriptive Statistics of Participating Sites*

	Urban Hospital Lusaka, Zambia (N = 149)		Rural Hospital Chibombo , Zambia (N = 104)	
	Mean (SD)	Range	Mean (SD)	Range
Age (years)	30.1 (8.1)	17 - 54	29.8 (7.9)	18 - 45
Education (schooling years)	8.6 (3.8)	0 - 18	7.9 (3.5)	0 - 16
BMI (kg/cm ^{2})	23. 6 (4.4)	16 - 49	22.5 (4.2)	15 - 37
Systole	126.8 (19.3)	90 - 220	113.1 (16.6)	80 - 170
Diastolic	77.0 (11. 4)	50 - 110	68.3 (10.4)	50 - 104
Typical Work Day (hours)	9.5 (4.5)	0.5 - 18	6.1 (3.4)	0 - 24

SD: Standard deviation

Consumption of alcohol, smoking, and physical activity were not correlated with elevated blood pressures. The p-values were .423 for smoking, .4 for alcohol consumption, and .079 for exercise. The single major correlate for high blood pressure in both the urban and rural area was BMI (Figure 1). Overall, 39% of those with a BMI over 25 in the urban hospital were hypertensive compared to 30% of those in the rural hospital. 22% of those with a BMI below 25 were hypertensive in the urban hospital compared to 4% of those in the rural hospital.

Figure 1. *Distribution of Blood Pressure by BMI Category*



DISCUSSION

In the urban population the highest BMI measured was 49 vs. 37 in the rural area. Also the highest BP reading was 220/110 compared to 170/104 in rural Zambia. Although our survey did not find a correlation between diet and alcohol consumption and BMI, it is evident that there is some difference between urban and rural populations that is producing these numbers. Some studies in West Africa have focused on the differences between rural and urban populations and show similarities with the findings of this population in Zambia. A 2002 study in Younde, Cameroon compared physical activity patterns of urban and rural dwellers in Cameroon, and studied their relationship with obesity, diabetes and hypertension. Obesity was diagnosed in 17.1% of the urban women vs. 3.0% of the rural women[12]. The prevalence of hypertension was significantly higher in urban vs rural dwellers (11.4 vs 6.6% in women and 17.6 vs 9.1% in men; $P < 0.001$). Diabetes was also more prevalent in urban rather than rural women Cameroon ($P < 0.05$), but similar differences were not seen inmen[12]. Lastly, urban subjects were characterized by lower physical activity ($P < 0.001$), light occupation, high prevalence of multiple occupations, and reduced walking and cycling time compared to rural subjects[12]. In Ghana, another study looked at the difference of blood pressures in urban and rural areas, and attempted to determine factors associated with BP in this sub-Saharan Africa population. The study found that living in an urban area was independently associated with an increased BP even after controlling for BMI, smoking, and alcohol consumption[11].

These findings suggest not only the impact of diet, but also as the presence of environmental factors that we were unable to measure. One article in the American Heart Association studying urbanization's effect on cardiovascular health, suggests that urbanization brings increasing stress levels, a decline of the traditional social support systems and the adoption of western lifestyles which includes consumption of higher calorie foods and a decrease of exercise contributing to higher BP levels[9]. The instrument we used could not adequately measure some of these factors. For example, the instrument measured how many fruits and vegetables the subjects ate, but did not measure other types of foods that could be consumed, such as high fat, high cholesterol, or high sodium containing foods.

A study in Nigeria sought to address this question of diet among urban vs. rural in its country. The study recorded the nutrient content of diets of 55 men, aged 20-75 years, and 77 women, aged 20-70 years,

who were inhabitants of a large urban center in northern Nigeria. Their serum levels of total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglycerides, were measured. These data were compared with those of the same rural Fulani population. Urban subjects consumed more calories than rural subjects (men: 2061 vs 1691 kcal; women: 1833 vs 1505 kcal) and had a significantly higher mean body mass index (BMI) and percentage of body fat than rural subjects. Both urban males and females had carbohydrate intakes that were greater than those of Fulani pastoralists (men: 56% vs 33% total calories; women: 51% vs 38% total calories[10]. This is just one study that looks at the metabolic profile of the urban vs. the rural individual. It may have been useful for our study to measure glucose and cholesterol levels in our population to relate that to our increasing risk of CVD.

CONCLUSIONS

Hypertension is prevalent in urban area more than that in rural area in Zambia. Many of the participating women are at risk for cardiovascular diseases. Those attending the clinic were unaware of their blood pressure problems resulting in missed opportunities for treatment to maintain their health whether pregnant or not. This major public health problem requires cost-effective methods for the timely diagnosis and management of hypertension. Increasing opportunities for diagnosis and low-cost life-saving interventions will result in hypertension prevention and control in primary and secondary care settings in Zambia. Low cost hypertension control and treatment strategies include engaging patients in moderate physical activity; encouraging maintenance of normal body weight, limiting alcohol consumption, reducing sodium intake, maintaining adequate intake of potassium, fruits, vegetables, and low-fat dairy products and foods reduced in saturated and total fat[13]. These interventions have resulted in documented reduced burden of cardiovascular diseases in western countries and are likely to have the same results if implemented in Zambia and other sub-Saharan countries.

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