Blood Pressure Survey in Two Communities in the Volta Region, Ghana, West Africa

Brent A. Burket, MD

Background: The prevalence of hypertension appears to be increasing in the developing world. A study published in 2003 showed a crude prevalence of 28.3% in the capital city of Accra, Ghana.[1] The prevalence of hypertension in many rural areas of the developing world is not known.

Objectives: 1) To survey two rural populations for hypertension; 2) to identify factors that may be associated with hypertension; 3) to assess the level of control of hypertension.

Study Design/Setting/Participants: 287 volunteers surveyed during market day in two villages in the Volta region of Ghana. Blood pressures were obtained after obtaining demographic and historical information. All individuals age ≥17 were included in the analysis. Hypertension was defined as a blood pressure ≥140/90 mm Hg on two separate occasions.

Results: The prevalence of hypertension in the populations surveyed was 32.8%. Factors associated with hypertension that reached statistical significance ($P<.05$) included family history of hypertension, consumption of akpeteshie, location of blood pressure assessment, and consumption of non-smoked fish (inverse association). More than 80% of those with a history of hypertension had an elevated blood pressure at the time of screening.

Conclusions: The proportion of hypertension in the rural populations surveyed is higher when compared to true prevalence studies and is most likely due, in part, to selection biases. The low hypertension control rates identified in people with a history of hypertension would need to be considered when determining whether to expand hypertension screening programs or to improve access to treatment for those with known hypertension in these resource-limited areas. (*Ethn Dis*. 2006;16:292–294)

Key Words: Developing World, Ghana, Hypertension, Rural, West Africa

From Margaret Marquart Catholic Hospital, Kpando, V/R, Ghana, West Africa.

Introduction

Margaret Marquart Catholic Hospital (MMCH) is a 170-bed hospital located in the Volta Region of Ghana, West Africa. Cerebral vascular accident (CVA) was a leading cause of morbidity and mortality that accounted for 13.1% of all deaths in the year 2000 and 11.9% in 2001.

An early study in 1976 at Korle Bu (a teaching hospital in Accra, the capital of Ghana) found that CVA was one of the three leading causes of death; the other two were heart disease and liver disease.[1] A study in 1977 that looked at the prevalence of hypertension in rural Ghana found the prevalence to be so low that the authors concluded, "Hypertension is not a significant health problem in rural Ghanaians and large-scale hypertension case-finding and intervention programs should be confined to urban populations."[2]

By 1994 the prevalence of hypertension in rural West Africa appeared to be increasing; a study in Liberia found an overall prevalence 12.5%.[3] A study published in 2003 looking at the prevalence of hypertension in Accra found a 28.3% crude prevalence of hypertension.[4]

The high incidence of CVA at MMCH is presumably secondary to hypertension. The prevalence and control of hypertension in this area is not known; therefore, a blood pressure survey/pilot study was conducted in March 2002 in two of the referring communities in rural Ghana. Because it was a pilot study, only one blood pressure reading was obtained. Results from the March 2002 survey were used to design the current study.

Address correspondence to Brent A. Burket, MD; La Clinica Del Valle Family Health Care Center; 3617 S. Pacific Hwy; Medford, OR 97501; 541-890-6152 (cell); 541-535 6239 (work); 541-772 8162 (fax); burketthoene@yahoo.com

Methods

This study (April 2002) was similar in methods to the pilot study but differed in historical information, body mass index (BMI), and obtaining a second blood pressure reading. The pilot study found only 3.2% tobacco use ($n=557$) without a statistically significant association to hypertension. Therefore, this risk factor was not evaluated further.

Two villages (Liati and Tokor) were chosen as representative of many of the communities within the Volta Region, either near the mountains or near Lake Volta. These were the same villages surveyed in the pilot study. Liati is situated on the eastern boarder of Ghana at the base of a mountain range separating Ghana from Togo. Liati has an approximate population of 22,268 within a 7-km radius. The village Tokor is situated near Lake Volta. Tokor has an approximate population of 117,169 in a 7-km radius.[5] They are separated from each other by ≈30 km. The daily activities in Tokor and Liati are related to their proximity to the lake; fishing and farming are prominent in Tokor, and farming is prominent in Liati. A team of five to six people went to the communities on market days. The team set up tables at a central location. Volunteers approached the tables and were seated and educated about the nature of the study and hypertension. After verbal consent was obtained, participants answered questions verbally.

Questions and data were obtained by a member of the team who was

Table 1. Selected indicators to hypertension

		Liati	Torkor	Total
Sex	male (%)	25.2	21.6	23.2
	female (%)	74.8	78.4	76.8
	n	131	153	284
Age (years)	mean	44.8	39.2	41.8
	median	43	38	40
	n	129	152	281
Family history of HTN	yes (%)	46.2	18.1	31.3
Personal history of HTN	yes (%)	27.9	11.2	18.9
BMI (kg/m^2)	mean	23.3	24.5	24.0
	median	23.0	23.5	23.2
	n	131	152	283
Overweight (BMI>25)	yes (%)	30.1	38.6	34.6
Overweight male and female	male (%)	9.1	30.3	19.7
	female (%)	37.4	40.8	39.3
Obesity (BMI>30)	yes (%)	6.0	11.8	9.1

HTN=hypertension; BMI=body mass index.

from the area and spoke the local language (Ewe). After the questionnaire was finished, an initial blood pressure was obtained with an adult-size mercury sphygmomanometer. If the first blood pressure was elevated (systolic blood pressure [SBP]≥ 140 mm Hg or diastolic blood pressure [DBP]≥90 mm Hg) the participants were asked to sit and wait for a second reading (average time between readings 26.5 minutes).

The teams were composed of locals (nurses and nurses' aids) and one physician from the United States. The physician performed all confirmatory blood pressures for those with an initial elevated blood pressure. Data obtained from the survey were then entered into EpiInfo 2000 (Centers for Disease Control and Prevention, Atlanta, Ga), and data were analyzed. Hypertension was defined as SBP≥140 mm Hg or DBP≥90 mm Hg obtained on two separate occasions. Training team members included repetitive blood pressure readings (blinded) until a difference of <4 mm Hg was obtained on two consecutive occasions on two different participants.

RESULTS

The frequency of hypertension was 32.8% overall. The percentage of females with HTN was 30.7% and males 39.4%. An increasing trend of hypertension was seen with increasing age. More men than women had hypertension in the 17- to 39-year-old age group. This difference reversed in the 40- to 59-year-old age group and was approximately the same in the >60-year-old group. The average BMI was 24 kg/m^2 (Table 1). A family history of hypertension was present in 31.3%, and a personal history of hypertension was present in 18.9% of the population surveyed. Smoked fish was consumed by 95% on a daily basis, whereas ≈33.5% consumed non-smoked fish at least once per week. Approximately 36% of the population surveyed consumed alcohol. Fifty-two percent of those who drank alcohol consumed >30 mL on a daily basis. The most common alcohol consumed was akpeteshie (a local gin, 79%).

The two populations surveyed differed in mean age (Liati 44.8 vs Tokor 39.2), percent of resident vs nonresident surveyed (Liati 90% vs Tokor 75%), frequency of hypertension (Liati 42.5% vs Tokor 24.2%), family history (Liati 46.2% vs Tokor 18.1%), personal history of hypertension (Liati 27.9% vs Tokor 11.2%), non-smoked fish consumption at least once per week (Liati 16% vs Tokor 33.6%), and consumption of alcohol (Liati 47.7% vs Tokor 25.9%). They were similar with regards to gender and BMI.

Factors associated with hypertension that reached statistical significance ($P<.05$) included family history, consumption of akpeteshie, location of blood pressure assessment (Liati), and consumption of non-smoked fish (Table 2).

Table 2. 2×2 associations of possible risk factors to hypertension

Association	OR	95% Confidence Interval	*P*
Sex (male) to HTN	1.46	.8–2.69	.189
Family history to HTN	2.26	1.29–3.96	.002
Obesity (BMI>30) to HTN	2.05	.86–4.88	.074
Alcohol (>60 mL/day) to HTN	1.85	.93–3.66	.057
Akpeteshie to HTN	1.92	1.04–3.54	.025
Village (Liati) to HTN	2.32	1.36–3.97	.001
Village (Liati) to HTN: age>39	2.2	1.07–4.53	.020
NSF (≥one per week) to HTN	.31	.16–.59	.0001

HTN=hypertension; OR=odds ratio; BMI=body mass index; NSF=non-smoked fish.

DISCUSSION/CONCLUSION

The prevalence of hypertension in the populations surveyed in this study (32.8%) is comparable to that seen in non-Hispanic Blacks in the United States (33.5%).[6] Factors associated with hypertension (family history, personal history, and alcohol [akpeteshie]) are consistent with known risk factors for hypertension. The inverse association of non-smoked fish consumption to HTN

may be related to the amount of omega-3 polyunsaturated fatty acids present or some other confounding factor not identified.

The difference in frequency of hypertension between the populations surveyed (Liati and Tokor) remains after accounting for the age difference between the two populations. The reasons for the difference between the populations surveyed in the two villages may be due to selection bias but may also be related to family history, alcohol consumption, and possibly the amount of fresh fish consumption.

One of the significant limitations of this study is selection bias; people with a history of hypertension may have been more (or less) likely to visit the screening table than others, and females were more likely to be at the market at the time of screening. This limitation explains the predominance of females surveyed (77% compared with 23% males), which is inconsistent with the population breakdown of this region (52% females, 48% males [data from Kpando District Assembly, Ghana census 2000]).

Another consideration is that Liati had a higher representation of residents at the time of screening than Tokor and may be more representative than Tokor. The sampling method used (ie, not random) raises other issues as well, including what drew participants to the screening table and how do these characteristics affect the data? Overall we cannot draw definitive conclusions about the applicability of these findings to the populations studied, but they do seem to be in accordance with other prevalence studies and known relationships of hypertension and gender.

Given these limitations, the proportion of hypertensives in our study with controlled hypertension (18.9%) appears to be significantly lower than in non-Hispanic Blacks in the United States (28.1%).[5] This lack of blood pressure control appears to support the contention that hypertension plays a significant role in the incidence of CVA at MMCH and has implications for future screening programs. Although a follow-up study surveying a random sample of the population may reveal the actual prevalence of hypertension, any screening program will not be effective unless resources are available to treat the condition. Hypertension appears to be increasing in the developing world, and it causes more illness and death.

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AUTHOR CONTRIBUTIONS

Design and concept of study: Burket
Acquisition of data: Burket
Data analysis and interpretation: Burket
Manuscript draft: Burket
Statistical expertise: Burket
Administrative, technical, or material assistance: Burket
Supervision: Burket