Heart and Cardiolgy: Open Access
Received: May 29, 2016, Accepted: Jul 12, 2016, Published: Jul 16, 2016
Heart and Cardiol, Volume 2, Issue 1
http://crescopublications.org/pdf/hcoa/HCOA-2-007.pdf
Article Number: HCOA-2-007

Research Article Open Access

Hypertension in Urban Population over 20 Years in Bamako, Mali

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Citation: Bâ HO, Camara Y, Menta I, Diall IB, Diarra A, Sidibé N, Kéita L, Coulibaly S, Diakité S, Diarra MB, Sanogo KM, Touré MK and Doumbia S (2016) Hypertension in Urban Population over 20 Years in Bamako, Mali. Heart and Cardiol 2: 007.

Abstract

Objective: To determine the prevalence of Hypertension in the urban setting of Bamako and to study the factors associated with hypertension in the population aged over 20 years.

Methods: The study based on the STEP approach, was conducted from November to December 2002 in Bamako involving 1162 subjects over 20 years. Blood pressure, height, weight, waist and hip were measured.
Data were analyzed with SPSS 12.

Results: Female sex and age group 25-34 made respectively 61.4% and 33.5% of the sample. Cardiovascular risk factors were overweight (19.3%), gynoid type of obesity (82.8%) and smoking (12.2%).
The prevalence of hypertension was 26.7%. It increased from 10.8% in the age of 25 to 83.8% for over 75 years (P <0.0001) and from 22.2% in subjects of normal weight to 73.3 in the morbidly obese (P <0.0001).
In multivariate analysis, only age and obesity had been good predictors of hypertension.

Conclusion: The high prevalence of hypertension requires measures (including implementation of educational programs on cardiovascular risk factors, facilitation of access to treatment for patients already suffering from hypertension) to prevent / reduce the adverse effects of hypertension.

Keywords: Hypertension; Urban population; Bamako

Introduction

Hypertension has been identified as the leading risk for mortality worldwide and a major cause of disability. Least and middle income countries (LMIC) accounts for nearly 640 millions cases of hypertension [1] with nearly 80 millions in sub-Sahara Africa [2].

Initial studies of Hypertension in Africa were primarily hospital-based studies and reported a prevalence ranging from 14 to 44.4% [3, 4].

Likewise in Mali, reported hospital-based prevalence of hypertension varied between 20.83% and 56.3% [5, 6] Hypertension has been found as primary motive for hospital admission with 32.2% and the leading cause of cardiovascular emergency in 53.2% [2, 6].

As the continent is considered as at a phase of epidemiological transition from communicable to non-communicable diseases (NCDs) because of the gradual adoption of unhealthy lifestyles hypertension is becoming a growing major public health problem Sub-Sahara Africa (SSA), particularly in urban setting. However, population based data on the prevalence of hypertension are scarce varying from 28.4% [7] in Ghana, 31.5% in Ethiopia [8] and 30.5% in Uganda [9]. In Mali, cross-sectional surveys performed outside of the capital Bamako found a prevalence of hypertension ranging from 5.6% in the northern region of Gao [10] to 23.7% in the Sahel region of Nara [11]. Hypertension accounted for 34% of all cardiovascular diseases (77 cases among 224 cardiovascular diseases) [12].

The scarcity and oldness of data on the prevalence of hypertension highlight the need for a large population based study to provide evidence-basis for elaboration of a prevention program for hypertension in Mali. This need is also supported by anecdotal report from health providers of an increasing number of hypertension patients in urban areas of the country. The present study describes the prevalence of hypertension and the associated risk factors in adult population of over 20 years old living in urban setting of Bamako, Mali.

Materials and Methods

Study Site

The study was conducted in the six “Commune” of Bamako [13] the capital city of Mali, located between 12° and 7° 38 N 59 W. The district of Bamako and vicinity is divided into 6 sub-districts (named commune) encompassing more than 2 millions inhabitants with women accounting for 49.8% of the population. The city lies over an area of 300 kilometers square on both sides of the river Niger with an average annual temperature of 27.8°. Between 1998 and 2009, the population has increased nearly by 1.8 times, with an annual average growth of 4.8%. Bamako has a cosmopolite population with all ethnic groups of the country represented in addition to foreign citizen of neighboring countries. The city hosts governments and administrative facilities as well as the major companies of the country with more than 70% of industrial enterprises and businesses, informal trade and handcraft workers. As in many other capital cities in SSA, the Populations are gradually changing lifestyle with more sedentary lifestyle and diet that may increase the risk of cardiovascular diseases.

Sampling and Data Collection Procedures

The study sample was obtained from a large household survey on cardiovascular diseases in the District of Bamako from November to December 2002, which enrolled 2199 subjects over 5 years all residents of Bamako. Briefly the study households per Commune were selected using a probability proportional to size (PPS) sampling approach. All subjects over 5 years old residents of the selected household present during the survey and willing to participate were included. The survey was conducted by 8 teams composed each of 1 Medical Doctor Cardiology resident and one medical student doing his internship. Each team performed house-to-house visits of PPS based selected households. During each visit, subjects were interviewed using a questionnaire designed following the WHO STEPS approach for chronic disease surveillance [13]. Households were revisited at least once in case household members were not present. Interviews were performed by medical Intern and focused on socio-demographic characteristics, lifestyle, cardiovascular risk factors, personal and family history of cardio-vascular diseases or other chronic illnesses. Physical examination and blood pressure measurement were performed by the cardiology resident after the interview. Systemic blood pressure was measured using an automatic digital blood pressure monitors (OMRON®) on the right arm after 5-minutes rest with the subject in the sitting position. Two independent measurements were obtained with a minimum interval of 5 minutes. The mean of the two blood pressure readings was used for each subject in this study. Blood pressure measurements for all subjects were done by the same doctor with the same automatic digital blood pressure monitor. Anthropometric measurements including height, weight, waist, and hip circumferences were done by the medical intern.

Height was measured without shoes to the nearest centimeter with subject stand on the footplate with back against stadiometer rule. Weight was measured to the nearest 0.1 kg on an electronic scale with the subject wearing light clothing and no shoes. Waist circumference was measured at the highest point of the iliac crest with the subject in light clothing. Ethical clearance for the study was obtained from the Ethical Review Committee of the University of Bamako.

The results reported here include only adult males and non-pregnant women of ≥ 20 years old for the analysis (1162 subjects).

Data Analysis

Definition

Hypertension was defined as systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg [14] or self-reported use of drug treatment for hypertension irrespective of measured blood pressure.

Isolated hypertension was defined as a blood pressure of ≥140 mmHg systolic (HIS) and <90 mmHg diastolic. Isolated diastolic hypertension was defined as a diastolic blood pressure ≥90 mmHg and systolic blood pressure <140 mmHg.

The different grades of hypertension were defined according to the JNC 7 report [20] as follows: stage 1: 140–159/90–99 mmHg, stage 2 ≥ 160/≥ 100 mmHg.

General obesity was defined by body mass index (BMI) (Table I) and further central obesity via the waist circumference (WC) (Table II) [15].

Table I: BMI cut-off points [22]

Classification	BMI (kg/m2)
Underweight	<18.5
Normal weight	18.5–24.99
Overweight	≥25.00
Pre-obese	25.00–29.99
Obese I	30.00–34.99
Obese II	35.00–39.99
Obese III	≥40.00

Table II: WC cut-off points

Classification	WC (cm)
Overweight	
Men	≥ 90
Women	≥ 80
Obesity	
Men	≥ 102
Women	≥ 88

BMI was calculated by dividing the subject's mass by the square of his or her height and expressed in metric. Overweight and generalized obesity were defined as body mass index (BMI) ≥25 and 30 kg/m^2, respectively.

WC was measured with a non-stretchable tape over the leight clothed abdomen at the narrowest point between the lowest rib and the iliac crest. Obesity was defined as waist ≥ 102 cm for men and ≥ 88 cm for women.

Analysis

Data were entered into the computer using Epi Info and crosschecked for validity using 10% sample of data report form. Statistical analysis was done using analytical software Statistical Package for Social Sciences (SPSS Inc, Chicago Ill) version 12. Results expressed as either mean values (standard deviation) or proportions. Comparison for statistical significance was by t test for continuous variables and chi-square or Fisher test analysis for categorical variables. Logistic regression analysis was used to identify the most significant predictors of hypertension.

Results

Socio-demographic Characteristics and Prevalence of Risk Factor for Hypertension

The sample included 1162 subjects with age varying from 20 to 104 years old with a mean age of 36,86 years (Male 37.67 and Female 36.35) and the median age was 31,00 The gender was predominantly female with 61.4% (sex ratio M: F = 0.63).

Housewives, office workers, handworkers and jobless were mainly represented with resp 30.6, 20.1, 17.6 and 19.1%.

The age group < 30 years, literate and under them primary level educations were predominant with resp 43.8, 66.4 and 58.6%.

Age group, profession and education level differed significantly between men and women (Table III).

Overweight, obesity and smoking differed significantly between men and women (Table IV).

Table III: Socio-demographics characteristics of the sample

Variables		Sex		Total % (N)	p
		Male	Female		
Age group (years)	< 30	42,5	44,6	43,8 (509)	0,05
	30-44	32,1	31,7	31,8 (370)	
	45-59	11,6	10,8	11,1(129)	
	60 and more	00,4	02,5	01,7 (020)	
Profession	Office workers	32,1	12,8	20,3(234)	< 0,0001
	Handcraft workers	35,7	07,0	18,1(209)	
	Student	15,8	08,7	11,4(132)	
	informal traders	16,3	71,6	50,1(578)	
Educational level	Primary school	48,4	67,1	58,6(442)	< 0,0001
	Secondary school	32,3	28,6	30,2(228)	
	High school	19,4	04,4	11,1(084)	

Tableau IV: Description of risk factors

Variables		Sexe		Total % (N)	p
		Male	Female		
General obesity	Normal weight	82,0	63,3	70,5 (819)	< 0,0001
	Overweight	14,0	22,7	19,4 (225)	
	Obesity	3,1	12,3	08,8 (102)	
Central obesity	Normal weight	88,2	57,2	69,2 (804)	< 0,0001
	Overweight	9,6	20,2	16,1 (187)	
	Obesity	2,2	22,6	14,7 (171)	
Smoking	Smoker	30,6	0,7	12,7 (142)	< 0,0001
	Not smoker	68,0	99,3	86,8 (972)	
	occasional smoker	1,3	0,0	00,5 (6)	
Alcohol consumption	Yes	0,2	0,0	00,1 (1)	0,218
	No	99,8	100,0	99,9 (1011)	
Known hypertension	Yes	10,8	13,9	12,7 (144)	0,127
	No	89,2	86,1	87,3 (991)	
Known diabetes mellitus	Yes	0,4	0,8	00,7 (8)	0,425
	No	99,6	99,2	99,3 (1147)	

Prevalence of Hypertension: (Table V)

The prevalence of hypertension was 26.7%.

Systolic-diastolic type of hypertension was predominant with 51.1% followed by systolic hypertension (40.1%) (Figure 1).

The communes 3 and 5 had the highest prevalence with 31.1 and 35.5% respectively (P = 0.003).

The prevalence of hypertension increased with age from 12.5% in the age of < 30 years to 55.0% for over 60 years (P <0.0001).

Approximately 25.5% of female subjects and 27.4% of males had hypertension (P = 0.471).

The subjects working in the informal sector and those of primary education level were the most affected subjects with resp. 32.1% and 23.8% (P <0.0001 and P = 0.024).

Physical inactivity and tobacco smoking were also more associated with hypertension.

Based on the BMI the prevalence of hypertension increased from 21.2 for normal weight to 58.4 in case of obesity (P <0.0001). The same trend was observed if WC was considered with increase from 20.9 for normal weight to 43.2 for obese ((P <0.0001).

Figure 1: Hypertension types

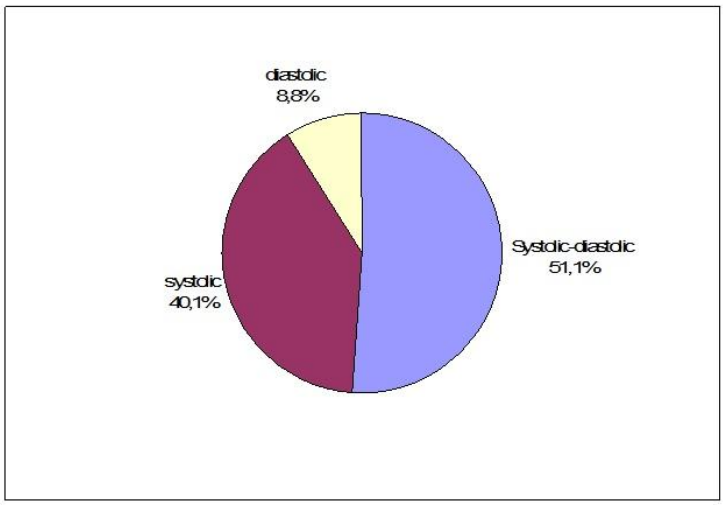

Table V: Prevalence of hypertension

Variables		%	Total	P
Commune	1	22,1	172	0,003
	2	23,5	136	
	3	31,1	106	
	4	22,8	206	
	5	35,8	265	
	6	23,4	265	
Age group (years)	< 30	12,5	502	< 0,0001
	30-44	21,3	367	
	45-59	46,9	128	
	>= 60	55,0	20	
Sex				
	Male	25,5	443	0,471
	Female	27,4	707	
Profession	Office workers	23,0	230	<0,0001
	Handcraft workers	25,7	206	
	Students	9,8	132	
	Informal traders	32,1	573	
Literate	Yes	20,6	762	<0,0001
	No	39,4	371	

Education level	Primary school	23,8	437	0,024
	Secondary school	16,0	225	
	High school	14,6	82	
Sedentarity	Yes	30,6	831	<0,0001
	No	14,3	231	
Tobacco smoking	Smoker	14,3	140	0,002
	Not smoker	28,0	963	
	occasional smoker	33,3	6	
BMI	Normal weight	21,2	811	<0,0001
	Overweight	30,6	101	
	Obesity	58,4	222	
WC	Normal weight	20,9	795	<0,0001
	Overweight	36,6	186	
	Obesity	43,2	169	

Logistic Regression (Table VI)

In multivariate analysis, only age and central obesity had been good predictors of hypertension.

Table VI: Model for hypertension risk factors

Variables	**Chi-2**	**P**	**OR**	**95% CI**
Age group(years)	$X^2 = 29,382$	< 0,0001		
< 30 vs 60 and more			25,507	4,253-152,972
31-44			13,189	2,207-78,812
45-59			4,892	0,781-30,648
WC (Central Obesity)	$X^2 = 10,481$	0,005	2,320	1,275-4,222
Normal weight vs obesity			1,135	0,584-2,208
Overweight vs Obesity				

Discussion

This study is the first of its kind by the sample size and quality of the survey in urban areas and the only one to have covered all six municipalities in the district of Bamako.

Prevalence:

Our 26.7% prevalence of hypertension in the urban population is high and confirms the increase in hypertension particularly in sub-Saharan Africa.

It is higher than 20.8% of Kengne [16], at the lower border of reported data in Ghana (25-48%) [17].

It remains lower than other studies in urban areas [6, 17] and in rural areas [5, 17].

It can be considered low compared to data from international studies [18, 19].

These different variations could be explained by the structure of the samples.

We expected to find higher prevalence data, as we have in our department an increasing number of hypertensive patients and frequent with hypertension associated complications, including stroke. One explanation could also be the absence of men in the survey time, even on weekends. These populations mostly active in the informal spend the day at the market.

Associated Factors:

Studies of blood pressure related to sex give sometimes small differences [20], sometimes no difference [21] and in some studies the proportion of hypertensive patients beyond 60 years is more important for women [22].

In our study, many factors were significantly associated with hypertension in univariate analysis (Table V).

The role of these factors was emphasized in a lot of work in sub-Saharan Africa and the world [23-28]. The interaction of these factors made a multivariate analysis mandatory.

In multivariate analysis, only age and central obesity were significantly associated with hypertension (Table VI).

So hypertension is associated with increasing age, which is consistent with literature data. In our model the risk of class 60 years and was 25 times greater compared to the class of under 30.

The risk of hypertension increased with central obesity with a 2, 3 x more risk for this group compared to normal weight subjects.

Tobacco smoking could not be assessed because of very small number of smokers (twenty). But tobacco has long been established as a risk factor for hypertension and needs to be explored in appropriate studies.

One lesson of this study is the role of obesity as a modifiable cardiovascular risk factor and should be taken into account in prevention programs. A study of this risk factor is needed to support these prevention programs.

Limitations

They have been the impossibility to make further investigations to systematically assess the impact of hypertension and identify other cardiovascular risk factors such as diabetes and dyslipidemia. Main reason for this situation is the financial limitation.

Conclusion

The high prevalence of hypertension requires the adoption of measures to prevent / reduce the adverse effects of hypertension. This is only possible through the implementation of educational programs on cardiovascular risk factors, coupled with the facilitation of access to treatment for patients already suffering from hypertension.

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