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Full Length Research Paper

Hypertension and classical risk factors in ambulatory patients: A hospital-based study in Adamawa region (Northern Cameroon)

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The aim of this study was to evaluate the mean levels of blood pressure and hypertension (140 mmHg systolic or 90 mmHg diastolic pressure or treatment for hypertension) in a sample of non random ambulatory subjects attending Regional Hospital in Ngaoundéré (Adamawa region, Cameroon) and to evaluate conventional risk factors for hypertension in patients diagnosed with hypertension. 233 patients were examined, 115 men and 118 women. Based on the mean blood pressure recorded, 117 subjects constituting 56 (47.9%) men and 61 (52.1%) women had hypertension. The mean age and standard deviation for males and females were 53.0±10.6 and 50.1±12.4 respectively. The prevalence of hypertension was estimated at 48.7% among men and 51.7% among women. The average systolic blood pressure (SBP), diastolic blood pressure (DBP) and pulse blood pressure (PP) were 178.9±4.6, 106.5±2.9 and 72.0±3.7 mmHg respectively among hypertensives. Men and women showed no significant difference in SBP, DBP, and PP levels. Analyzing conventional risk factors for hypertension, we found over 90% of subjects with at least one risk factor. Among the classical risk factors for hypertension, lack of exercise and weight abnormality appears to be the predominant risk factors for hypertension before alcohol consumption, and tobacco smoking.

Key words: Hypertension, Adamawa, risk factors, blood pressure levels.

INTRODUCTION

According to recent epidemiologic data, almost 28% of the general population is suffering from hypertension in Sub-Saharan Africa (Kearney et al., 2005). It is well documented that the latter is also responsible for cardiac, cerebrovascular and renal complications, particularly devastating (Steyn et al., 2005; Agaba et al., 2004; Mensah, 2008; Onwucheva et al., 2009).

Considering the high level of complications associated with hypertension, early screening and prevention have great importance in achieving the goal of the reduction of frequency of the disease. One approach to such prevention is through a struggle against risk factors previously clearly identified and accessible to prevention for the greatest number of individuals. In Cameroon, as elsewhere in Sub-Saharan Africa, hypertension presents with great disparity depending on the region (Edwards et al., 2000; Agyemang, 2006). Research studies on hypertension and associated risk factors in the northern part of Cameroon which is the most populated, is however still very scarce. The aim of the present study was twofold: (i) assess the severity of hypertension by analyzing the average blood pressure level in a sample of ambulatory patients consulting in Regional Hospital of Ngaoundéré (Adamawa region, Cameroon), and (ii) assess the prevalence of classical risk factors for hypertension in this same population.

PATIENTS AND METHODS

The final analytic sample consisted of 233 subjects, constituting 115 men and 118 female recruited for the present study among volunteer ambulatory patients that consulted in Regional Hospital of Ngaoundéré from June, 2010 to September, 2010 for cardiological

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assessment. The age range of recruited subjects was between 24 and 79 years. The present sample was selected for particular trait and therefore, may be considered as non random sample. For data collection, clinical examination (including measurement of blood pressure) and personal interviews were held with each subject. The information was also collected for any other existing disease or any other disorder and current use of antihypertensive drugs. All this obtained information was recorded and kept in detail in the individual patient file and were also summarized in a collective register. This study received approval from the administrative authorities of the hospital.

Blood pressure measurements

The measurements were taken with the help of aneroid sphygmomanometer OMRON HEM-705 CP, in a sitting position with the right forearm placed horizontally on the table. The recordings were taken as recommended by the Guidelines for the Management of Arterial Hypertension jointly issued by the European Society of Hypertension and the European Society of Cardiology (2003, 2007). An appropriate sized cuff was fitted on the arm of the subject and was inflated to about 20 mmHg above the point at which the radial pulse disappeared. The pressure within the cuff was then released at a rate of approximately 2 mmHg/s, while osculating with a stethoscope placed over the brachial artery. The onset of sound (Korotkoff-phase I) was taken as indicating the systolic blood pressure (SBP) and the disappearance of sound (Korotkoff- phase V) was taken as indicating the diastolic blood pressure (DBP). Two measurements were performed at 30 min intervals; the average of the two measurements was taken into account. Hypertension was defined as SBP ≥ 140 mmHg or DBP ≥ 90 mmHg. Subjects following antihypertensive treatment were considered as definite hypertensive, whatever their actual level of blood pressure. The category of hypertension used was that of the European Society of Hypertension and the European Society of Cardiology (2007).

Anthropometric measurement

Height was measured (to the nearest 0.5 cm) with the subject standing in an erect position against a vertical scale of portable stadiometer and with the head positioned so that the top of the external auditory meatus was in level with the inferior margin of the bony orbit. Body weight was measured (to the nearest 0.5 kg) with the subject standing motionless on the bathroom weighing scale (Jellife and Jellife, 1989). Body mass index (BMI) was calculated by dividing weight of the subject in kilograms by square of his/her height in meters. Overweight was defined for values in BMI between 25 and 30 kg/m^2 and obesity for values greater than or equal to 30 kg/m^2 (WHO threshold).

Other variables of interest

Variables related to lifestyle such as alcohol consumption, smoking, and physical activities, were collected. Smokers were considered as individuals who smoke at least one cigarette per day. Heavy drinkers of alcohol were considered as subjects consuming an average of at least three glasses of alcohol per day or 21 g/week. Physical inactivity was defined as a practice of sport less than one hour per week. The educational level was studied by considering the level of highest degree obtained; 4 classes were used thus: illiterate, primary, secondary, tertiary.

Statistical analysis

Statistical analysis was performed using SPSS 12 version 12.01. Data were expressed as mean and standard deviation. The data analysis involves the analysis of variance (ANOVA). Significance level was considered at $p<0.05$ for all analysis.

RESULTS

Patients characteristics and epidemiologic profile of hypertension

233 patients were examined, 115 men and 118 women. Based on the mean blood pressure recorded, 117 subjects constituting 56 (47.9%) men and 61 (52.1%) women had hypertension. The mean age and standard deviation for males and females hypertensive cases were 53.0 ± 10.6 and 50.1 ± 12.4 respectively. The prevalence of hypertension was estimated at 48.7% in men and 51.7% among women. Among the 117 hypertensive patients, 74.4% (n = 87) resided in the northern regions of Cameroon: Adamawa, North, Far North. 78.6% (n = 92) lived in urban areas and 21.4% (n = 25) in rural areas. Regarding the level of education, 37 (31.6%) patients had primary school education, 22 (18.8%) a high school education, 28 (23.9%) a level of graduate and 30 (25.6%) were illiterate. 52 (44.4%) patients were without activity, among them, 46 (39.3%) were housewives. The others were craftsmen (n = 6; 5.1%), civil servants (n = 41; 35.0%) or traders (n = 18; 15.4%).

Distribution of hypertensive subjects according to age is presented in Table 1. Number of hypertensive regularly increased with age, with a maximum between 50 and 59 years of age. Less than 5% of subject before 30 years of age were hypertensive, however near one quarter of male or female were hypertensive between 30 and 49 years and one third between 50 and 59 years. The proportion of hypertensive subjects decreased after 59 years for both sex.

Mean blood pressure measured

The average systolic blood pressure (SBP), diastolic blood pressure (DBP) and pulse blood pressure (PP) among hypertensives were 178.9 ± 4.6, 106.5 ± 2.9 and 72.0 ± 3.7 mmHg respectively. Men and women showed no significant difference in SBP, DBP, and PP levels (Table 2).

SBP increased steadily with age, from 62.5 ± 8.0 mmHg for patients younger than 29 years to 186.0 ± 21.4 mmHg for the age group of 70 to 79 years. DBP was 112.5 ± 15.2 mmHg for patients younger than 29 years; it then decreased between 30 and 39 years to stabilize at 104.0 ± 11.3 mmHg. The average pulse pressure ranged from 50.0 ± 18.4 to 82.0 ± 17.5 mmHg; it increased across the whole age range. Mean SBP, DBP and PP by age are shown in Table 3.

Systolic blood pressure ranged between 120 and 280 mmHg and diastolic blood pressure between 80 and 150

Table 1. Distribution of hypertensive subjects according to age.

Subject	Age group (Years) n (%)						
	< 29	30–39	40–49	50–59	60–69	70–79	Total
Men	0 (0.0)	4 (3.4)	14 (12)	24 (20.5)	9 (7.7)	5 (4.3)	56 (47.9)
Women	4 (3.4)	9 (7.7)	13 (11.1)	21 (17.9)	9 (7.7)	5 (4.3)	61 (52.1)
All	4 (3.4)	13 (11.1)	27 (23.1)	45 (38.4)	18 (15.4)	10 (8.6)	117 (100)

Table 2. Mean systolic, diastolic and pulse pressure by gender.

BP (Mean)	All	Men	Women	p*
SBP± SD	178.9 ± 4.6	179.2 ± 6.5	178.6 ± 6.8	NS
DBP ±SD	106.5 ± 2.9	104.9 ± 4.2	108.2 ± 4.0	NS
PP ±SD	72.0 ± 3.7	73.7 ± 5.5	70.2 ± 5.0	NS

*p-the comparison between men and women.

Table 3. Mean systolic, diastolic, and pulse pressure by age.

BP (Mean)	Age (Years)					
	< 30	30-39	40-49	50-59	60-69	70-79
SBP ± SD	162.5 ± 8.0	170.4 ± 9.9	174.8 ± 9.4	182.8 ± 8.4	181.1 ± 12.0	186.0 ± 21.4
DBP ± SD	112.5 ± 15.2	106.9 ± 9.0	110.0 ± 6.2	104.6 ± 5.1	106.1 ± 7.8	104.0 ± 11.3
PP±SD	50.0 ± 18.4	63.5 ± 6.8	64.8 ± 6.9	77.4 ± 6.4	75.0 ± 8.2	82.0 ± 17.5

Table 4. Hypertension category by gender.

Category	Men			Women			t	p*
	Frequency	%	95% CI	Frequency	%	95% CI		
Grade I	2	3.6	(-1.4 - 8,6)	8	13.1	(4.4 – 21.8)	1.856	NS
Grade II	22	39.3	(26.1 – 52.5)	20	32.8	(20.7 – 44.9)	0.727	NS
Grade III	22	39.3	(26.1 – 52.5)	30	49.2	(36.3 – 62.1)	1.072	NS
Isolated SH**	10	17.8	(7.5 – 28.2)	3	4.9	(-0.7 – 10.5)	2.204	0,03
Total	56	100.0	--	61	100.0	--	--	--

*p-the comparison between men and women. ** Isolated systolic hypertension.

mm Hg. Severe hypertension (grade II and III) was found in a little over 80.0% (n = 50) of female patients. This proportion was 78.6% (n = 44) in the male population. There was no statistically significant difference between men and women for each level of blood pressure while isolated systolic hypertension was significantly more common in men compared to women 17.8% versus 4.9% (p = 0. 03). The distribution of blood pressure category by gender is presented in Table 4.

Regarding the distribution of blood pressure levels by age, severe hypertension (grade II and III) uniformly concerned all age groups with predominance for 40 to 49 years age group. Grade I hypertension was distributed among all age groups (Table 5).

Risk factors for hypertension

The analysis of associated risk factors among hypertensives showed that only 6 (5.1%) patients had no risk factor, 29 (24.8%) had one risk factor, 58 (49.6%) had two risk factors, 21 (17.9%) had three, and 03 (2.6%) had four. The frequency of sedentary was 43.6%; 44.6% in men and 42.6% in women (p = 0.83), family history of hypertension was found in 35.7% (n = 20) of men and 50.8% (n = 31) of women (p = 0.10). An abnormality in weight (overweight or obesity), was found in a little over 64% of patients. The prevalence of overweight was 32.5% among hypertensives, it was 33.9% in men and 31.1% in women (p = 0.75). At the same time, there was

Table 5. Blood pressure category by age.

Category	Age (years)						
	< 29; n(%)	30 – 39; n(%)	40 – 49; n(%)	50 – 59; n(%)	60 – 69; n(%)	70 – 79; n(%)	Total; n(%)
Grade I	1(0.9)	3(2.6)	1(0.9)	2(1.7)	2(1.7)	1(0.9)	10(8.6)
Grade II	3(2.6)	5(4.3)	12(10.3)	15(12.8)	5(4.3)	2(1.7)	42(35.9)
Grade III	0(0.0)	5(4.3)	13(11.1)	20(17.1)	9(7.7)	5(4.3)	52(44.4)
Isolated SH**	0(0.0)	0(0.0)	1(0.9)	8(6.8)	2(1.7)	2(1.3)	13(11.1)
Total	4(3.4)	13(11.1)	27(23.1)	45(38.5)	18(15.4)	10(8.5)	117(100)

** Isolated systolic hypertension.

Table 6. Risk factors by gender among hypertensives.

Risk factor	All			Men			Women			t	p*
	Frequency	%	95% CI	Frequency	%	95% CI	Frequency	%	95% CI		
Sedentary	51	43.6	(34.5 – 52.7)	25	44.6	(31.2 – 58.1)	26	42.6	(29.9 – 55.4)	0.218	NS
History of hypertension	51	43.6	(33.6 – 51.8)	20	35.7	(22.8 – 48.7)	31	50.8	(36.3 – 62.1)	1.651	NS
Overweight	38	32.5	(23.9 – 41.1)	19	33.9	(21.1 – 46.7)	19	31.1	(19.2 – 43.1)	0.318	NS
Obesity	37	31.6	(21.5 – 38.3)	16	28.6	(14.8 – 38.8)	21	34.4	(20.7 – 44.9)	0.676	NS
Alcohol intake	22	18.8	(11.6 - 26)	16	28.6	(16.4 – 40.8)	6	9.8	(2.1 – 17.5)	2.646	0,01
Smoking	10	8.5	(4 – 14.8)	7	12.5	(3.6 – 21.4)	3	4.9	(0.2 – 12.9)	1.466	NS

*p-the comparison between men and women

no significant difference between men and women with regard to obesity: 28.6% versus 34.4% (p = 0.50), it concerned 31.6% (n = 37) patients. Alcohol consumption was found in 18.8% (n = 22) of patients. The prevalence of alcohol consumption was statistically higher in men than in women: 28.6% versus 9.8% (p = 0.01). Smoking prevalence was 8.5%, men were more often smokers than women, but this difference was not statistically significant 12.5% versus 4.9% (p = 0.15). Distribution of risk factors by gender among hypertensives is represented in Table 6.

DISCUSSION

The purpose of this study was to analyze epidemiologic profile of hypertension and evaluated classical risk factors associated with high blood pressure. These objectives were examined in a population of Adamawa region in the northern Cameroon. The observations were done from the Regional hospital of Ngaoundéré. Analysis of the data obtained shows that women (51.7%) have higher prevalence of hypertension as compared to men (48.7%). This observation is consistent with many previous studies on population of African origin (Mendez et al., 2003; Attalah et al., 2008).

It has been suggested that sex hormones may contribute to the gender difference in blood pressure control (Reckelhoff, 2001; Sowers et al., 2007). In the present study, overall, 55% hypertensive females were above 40 years of age. This may explain the higher hypertension rate among women compared to men. However, our findings differ from another report in urban black population showing a significantly higher prevalence of hypertension in men than in women (Kimbally-kaky

et al., 2006).

Reports such as ALLHAT (Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial, 2002) or practice recommendations such as those from JNC VII (Chobanian et al., 2003) have emphasize increased attention to blood pressure control and the health benefit of lower blood pressure goals. Mean blood pressure recorded was 178.9 ± 4.6/106.5 ± 2.9 mm Hg and rate of severely hypertensives was 88.5% in our hypertensive male and female subjects combined. We speculate that, poor control of blood pressure level, insufficient awareness and control of hypertension may have contributed to this observation. The reluctance of patients to care should be pointed out; the fact of being treated for a disease whose clinical presentation is most often asymptomatic, being often misunderstood and viewed in the socio-cultural context of sub-Saharan Africa as being inappropriate by the patient (Muna, 1999). Another possible explanation for high proportion of severely hypertensive subjects observed might be the confidence maintained to traditional medicine. It might be possible that, because of the difficulties of access to medical structures on the one hand, and usual beliefs on the other hand, the major part of individuals sought partially or exclusively traditional medicine. Interestingly, the latter reason is similar to that reported in the mid 1980s in a study on blood pressure and hypertension in a sample of urban Bantu (M'Buyamba-Kabangu et al., 1986). If so, then educational intervention may be of great importance to improve the detection and diagnosis of hypertension and maximize cardiovascular health in the northern regions of Cameroon.

The findings of the current study provide important information on traditional risk factors for hypertension in Adamawa, where information is specially lacking. Family history of hypertension and factors known as related to increase blood pressure (smoking, alcohol consumption, obesity and overweight) has been evaluated.

We found over 90% of hypertensives with at least one risk factor. More than 21% of hypertensive cases had more than two risk factors, hence presumably high risk hypertensives. Our data also shows that weight abnormality affects nearly 64% of patients, suggesting that obesity and overweight have a place of leading risk factor for hypertension. These findings are in agreement with recent reports (Opie and Seedat, 2005; Mufunda et al., 2006). It is now well documented that excess body fat predisposes to raised blood pressure and hypertension (Stamler, 1991). Weight reduction reduces blood pressure in overweight patients and has beneficial effects on associated risk factors, such as insulin resistance, diabetes mellitus, hyperlipidemia, and left ventricular hypertrophy. In a meta-analysis of available studies the mean systolic and diastolic pressure reductions associated with an average weight loss of 5.1 kg were 4.4 and 3.6 mmHg, respectively (Neter et al., 2003). Therefore, in a context where health resources are limited and sanitary education level still poor, early intervention in form of physical activities may help in preventing the onset of the disease. The present study also found a higher incidence of obesity in women than in men: 28.6 versus 34.4% ($p = 0.5$). This is in agreement with literature data (Attalah et al., 2007). The higher female prevalence of obesity may relate in part to motherhood and trophics determinants with diet rich in fat and carbohydrate (Etoundi et al., 2001).

Regarding other risk factors, our data shows that alcohol consumption and tobacco smoking occupy the last but one and last places with respective frequencies of 18.8 and 8.5%. The prevalence rate of alcohol consumption observed appears to be lower than the 22.1% reported in Togo (Damorou et al., 2008) but somewhat greater than the 16% reported in urban Rwanda (Twagirumukiza et al., 2003). The relatively low incidence of smoking, with male predominance, and lower rates of alcohol consumption observed might be attributed to cultural factors; it might be because the population study is Muslim with strong allegiance.

Limitations

This study has some limitations. First, our blood pressure levels were based on the average of two measurements at a single visit contrary to current recommendations (William et al., 2004).

Secondly, it concerns a selected population in hospital settings, presumably suffering from hypertension or voluntary to a clinical examination. This might overestimate the prevalence rate among both genders. However, the latter limit is in the same time an interest in this work because it stresses the need for studies on a larger scale to provide additional information in epidemiology of hypertension in the northern regions of Cameroon.

Conclusion

In spite of the relatively reduced size of our sample, our findings demonstrate a need for improvement in diagnosis of hypertension in basic regional health centers and in blood pressure therapy to reach currently recommended targets treatment goals. The significant proportion of severely hypertensive subjects requires greater awareness to consult for hypertension and management of hypertension in hospitals settings. Among the classical risk factors for hypertension, lack of exercise and weight abnormality appears to be the predominant risk factor for hypertension in our study before alcohol consumption, and tobacco smoking. Therefore, given the high cost of medication relative to income in northern Cameroon as in other part of the continent, obesity and overweight, are the factors on which could be based preventive measures.

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