



The Prevalence of Arterial Hypertension and associated factors in the Senegalese population in Dakar

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ABSTRACT

Arterial Hypertension (AH) is considered as a public health problem due to its high prevalence and difficult control and it's also described as one of the most important risk factors for cardiovascular diseases. This study aimed to determine the prevalence of AH, as well as characteristics related to the presence of its inherited aspect among individuals aging between 24 and 70 years from the urban region of Dakar. Transversal study from January 2010 to January 2011, population-based study, of 620 participants with random sampling. For classification of AH, criteria included blood pressure (BP) $\geq 140/90$ mmHg or current use of antihypertensive drugs. Individuals were interviewed with standardized questionnaires previously tested. Arterial Hypertension has a prevalence of 51.6 % in this sample of Senegalese population in Dakar, which is composed of 620 individuals. Among hypertensive individuals (n= 320), mean age was 50.6 years, 73.33% was female hypertensive, 31.25% male hypertensive and 62.5% with a family history of Arterial Hypertension, among them : 46% with a maternal family history (FH), 31% with a fraternal FH, 20% with a paternal FH and 4% with a dead fraternal FH, 41% had a family history of cardiovascular disease where those with a stroke family history : 36.58% had a maternal FH, 12.19% with a paternal FH and 7.31% with a fraternal FH, 13.41% with a dead fraternal FH. This study showed that AH represents an important public health problem with its high prevalence within this population.

Keywords: Arterial Hypertension, epidemiology, prevalence, family history.

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INTRODUCTION

Arterial hypertension (AH) is among the most frequent disease in Senegal. The role played by AH in the development of cardiovascular diseases (CVD) stresses the importance of knowing its distribution in different Senegalese regions, where around 35% of the Senegalese population is hypertensive¹. Blood pressure (BP) is a linear and continuous variable which presents a positive association with the risk for cardiovascular diseases², so that the relationship between cerebrovascular disease and BP is also continuous, increasing and significant in levels higher than 115-75 mmHg, for all age groups³.

According to the WHO (World Health Organization) guidelines for arterial hypertension, adult individuals are classified as hypertensive when the systolic blood pressure (SBP) reaches values equal to or higher than 140 mmHg, and/or when the diastolic blood pressure (DBP) is equal to or higher than 90 mmHg, in two or more occasions and in the absence of anti-hypertensive treatment. Blood pressure was considered as normal when lower than 130/85 mmHg, and optimal when lower than 120/80 mmHg⁴.

Arterial hypertension is considered as a syndrome, for its frequent association to a number of metabolic disorders, such as obesity, increased insulin resistance, diabetes mellitus and dyslipidemia, among others. The existence of these risk factors and of lesions in target organs, when present, is important and must be considered for the stratification of individual risks, so that prognosis and therapeutic decisions may be correctly conducted⁴.

Although blood pressure displays substantial heritability, typically reported at 30 to 60%, hypertension is likely to be heterogeneous phenotype trait⁵. The family history of AH is largely associated with AH^{6,7}. The present study analyzed and interpreted some epidemiological aspects of arterial hypertension in a sample of Senegalese population with a main focus on the family history of AH.

MATERIALS AND METHODS

Transversal study, which was population-based, with random sampling, in three health centers (two in a peripheral area and one in the Cardiology Unit). This work is part of the "Arterial Hypertension Project". This collaborative study aimed to investigate the occurrence of arterial hypertension and cardiovascular disease and their relationship with the family history of each disease in the city of Dakar. Information on social-demographic variables and life habits and family history of AH and CVD of adult and aged individuals (24 to 70 years old), living in the city of Dakar, were collected during the period between January 2010 and January 2011 by the

use of a standardized questionnaire answered at the health centers. The sample was estimated in 620 individuals, the participants included were those coming for examination and their family members or friends who were with them. They were initially informed on objectives and procedures and were then invited to voluntarily participate to the study. Consenting individuals signed an informed consent form.

The inclusion criteria were: people aged from 24 to 70, the hypertensive were defined as having an elevated systolic blood pressure $SBD \geq 140$ mmHg and sustained diastolic blood pressure $DBP \geq 90$ mmHg, or who were currently receiving antihypertensive therapy. Any Subjects with possibility of a secondary hypertension were excluded. Hypertensive subjects whose parents both had hypertension were considered to have a positive family history of hypertension. Normotensive was defined as those with a blood pressure of less than 140/90 mmHg, both groups with subjects under the influence of estrogen, thyroid, and cortisol hormones were excluded. This research was conducted by the members of the project and doctors of the health Centers; they applied the standardized, pretested questionnaires and measured blood pressure variables. Measurements included blood pressure with a Sphygmomanometer (KDM CE 0123). Blood pressure was measured with the person in sitting position, feet placed on the floor, left arm relaxed and placed on the table at heart level and hand palm up.

The person should have an empty bladder and should not have had moderate or intensive physical activity, smoked or drank alcohol during the previous 30 minutes. For analysis, the last BP measurement was considered, as long as the difference between them was not larger than 5 mmHg. In case of larger differences, BP was measured two further times, with 3-minute intervals, and the last measurement was considered. The outcome was considered was presence or the absence of arterial hypertension, defined according to the WHO guidelines, the following independent variables were considered:

- 1) Independent sociodemographic variables: a) age - in completed years, b) gender - male or female; c) marital status
 - 2) Life-habit independent variables
 - 3) The family history of arterial hypertension: Maternal, Paternal, Fraternal, Dead Fraternal
 - 4) The family history of cardiovascular diseases (CVD) such as stroke and myocardial infarction
- Information was recorded twice, with the establishment of two databases which were compared for correction of eventual inconsistencies. Data were analyzed with the EPI INFO-2000 software and SPSS software.

RESULTS AND DISCUSSION

Our population was composed of 620 persons where 51.61% male and 48.38% female with a sex ratio of 1.06. The prevalence of arterial hypertension among this sample was 51.61% with a female predominance (Table 1). Among hypertensive population, the mean age was 50.6 years, with a mean systolic blood pressure (SBP) of 139.56 and a mean of diastolic blood pressure (DBP) of 89.22. We have noticed within this population of hypertensive, 87% were treated and 75% had Type 2 diabetes (Table 2). The specificity of this population is the presence of 62.5% of a family history of arterial hypertension among the hypertensive; we found that 46% had a maternal history, 31% with a fraternal history, 20% with a paternal history and 4% with a dead fraternal history (Table 3). This population with a family history of arterial hypertension was characterized also with the presence of a family history of cardiovascular disease (41%), such as stroke and myocardial infarction. Among this latter sample, those with a family history of stroke were 36.58% with a maternal family history, 12.19% with a paternal family history and 7.31% with a fraternal family history, 13.41% with a dead fraternal family history (Table 4). Those with a family history of myocardial infarction (MI) were: 9.75% with a maternal family history of MI, 14.63% with a paternal family history, 4.86% a fraternal family history, and 2.43% with dead fraternal family history (Table 5).

Table1: Distribution of hypertensive according to the sex

Classification	Hypertensives		Normotensives		Total
	n	%	n	%	
Male	100	31.25%	220	68.75%	320
Female	220	73.33%	80	26.66%	300
Total	320	51.61%	300	48.37%	620

n-Number of individuals.

Table 2: Clinical characteristics of normotensive and hypertensive participants

Characteristics	HT Value	NTn=320n=300	P
Age (years)	50.6 ± 8.92	53.75 ± 7.96	0.85
Male/ Female	100/220	220/80	NS
SBP (mmHg)	152.44±12.37	116.21±13.24	p<0,0001
DBP (mmHg)	92.49 ± 6.72	73.55 ± 6.13	p<0,0001
BMI (kg/m ²)	28.5±3,9	25,1 ± 3,1	p<0,001
Smoking habit 1	52 (47.5%)	84(28%)	p< .001
Diabetes mellitus	240(75%)	36 (12%)	p< .001
Family history of HTN :	200 (62.5%)	54(18%)	p<0,001
Family history of CVD and HTN	82(41%)	57(28,5%)	p<0,05
Family history of Diabetes mellitus	20,5%	16,5%	NS

All the data were presented as mean ± SD. EH, essential hypertensive patients; NT, normotensive subjects; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; CVD :Cardiovascular disease ; HTN :Hypertension

Table 3: Distribution of hypertensives according to the origin of the family history of arterial hypertension

	Hypertensives with a Family History of AH (n=200)	
	n	%
Maternal familiar history	92	(46%)
Paternal familiar history	40	(20%)
Fraternal familiar history	62	(31%)
Dead Fraternal familiar history	8	(4%)

n-Number of individuals.

Table 4: Distribution of hypertensives according to the origin of their family history of cardiovascular disease (Stroke)

	Hypertensives with family history of CVD (stroke)	
	n	%
Maternal familiar history	30	36.58%
Paternal familiar history	10	12.19%
Fraternal familiar history	6	7.31%
Dead Fraternal familiar history	11	13.41%

n-Number of individuals.

Table 5: Distribution of hypertensives according to the origin of their family history of cardiovascular disease (Myocardial Infarction)

	Hypertensives with family history of CVD (MI)	
	n	%
Maternal familiar history	8	(9.75%)
Paternal familiar history	12	(14.63%)
Fraternal familiar history	4	(4.87%)
Dead Fraternal familiar history	2	(2.43%)

n-Number of individuals.

The present study is the first report in the investigation on the prevalence and up to now there is no study on the family history of Arterial hypertension in the population of Dakar, which the capital and in the whole country. We found a high prevalence of Arterial Hypertension with 51.6%, and it's increasing alarmingly in the whole Senegalese population and other developing nations⁹. This high prevalence may be only noticed in urban area¹⁰. This hypertensive population is characterized with a female predominance of Arterial hypertension with 73.33%, comparing to the male where we found only 31.25% hypertensive one, this is due to the early menopause noticed which may play a major role in their high prevalence of Arterial hypertension¹¹. According to the WHO (World Health Organization), women are highly protected from AH before menopause¹². Other studies in Algeria have confirmed these findings. Although the high prevalence of AH, 87.5% were under treatment which points the major role

that play the health services, among this studied sample of hypertensive, 75% had Type 2 Diabetes associated with AH, which may enhance the risk of developing a coronary diseases, end stage renal diseases, and peripheral vascular diseases^{13,14}. This result has also been confirmed in West Africa Population¹⁶. Nevertheless, essential arterial hypertension and type 2 diabetes are under interplay between genetics and environmental factors^{17,18}.

The strength and the originality of this study is the focus on the family history of Arterial hypertension and cardiovascular disease, we found that nearly 62.5% of the hypertensive have a family history of Arterial hypertension, this joins the fact that genetic factors are responsible of the two thirds of the familial aggregation of blood pressure and with the transmission of cultural factors which are responsible for the remaining third¹⁹. Thus, the family history of AH are highly associated with the increasing risk of developing arterial hypertension.

However, among this population with a family history of AH, the maternal family history is the most prevalent with 46%, followed by the Fraternal family history with 31%, these observations are in line with earlier report providing evidence that when one parent is hypertensive, almost 28.3% of their children will be hypertensive, 45%, for those with two hypertensive parents²⁰.

Therefore the heritable factors in combination with a number of recognized environmental risk factors are important determinants of the pathogenesis of natural history of essential hypertension²¹.

Another important aspect of this study is the presence of family history of cardiovascular disease among hypertensive with family history of AH, with exclusive inclusion of patients having a family history of CVD before 65 years, which increase the probability that genetic factors are involved to a significant degree in the onset of MI. we noticed that 14.63% have a paternal family history of myocardial infarction vs. 9.75% with a maternal history of MI, It is well known that women develop CVD about 10 years later than men,

probably due to the protective effects of female sex hormones but also due to the different frequency of classical risk factors such as diabetes, hypertension and smoking habits^{22,23}. Where 36.5% of this population has a maternal family history of stroke.

So can we attribute the heritability of stroke and myocardial infarction to the gender? Until now, there is no evidence of this aspect since the complexity of these pathologies.

In recent years, genome-wide association studies (GWAS) have displayed an effective approach to localize genomic regions predisposing to common, polygenetic disorders, including cardiovascular disorders²⁴.

CONCLUSIONS

Our study points the high prevalence of arterial hypertension among this population and need more accurate studies focusing on other risk factors of arterial hypertension. However, our original findings about family history of arterial hypertension and CVD diseases will constitute a data base and a long road to take in the determination of the heritability of blood pressure by doing linkage studies in order to a better understanding of the gene contribution in Arterial Hypertension and cardiovascular diseases.

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Conflict of Interest: None declared.

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