



GLOBAL JOURNAL OF MEDICAL RESEARCH: F
DISEASES

Volume 15 Issue 1 Version 1.0 Year 2015

Type: Double Blind Peer Reviewed International Research Journal

Publisher: Global Journals Inc. (USA)

Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Rates of Hypertension Prevalence, Awareness, Treatment, and Control in a Congolese South-West Port City. The Influence of Gender According to Age Groups

By Bernard Kianu Phanzu, Mpembele Mabaka Evelyne, Eleuthère Kintoki Vita, Jean Robert Makulo Risassi, Floriant Kiazayawoko Zola, Jean De Dieu Manyebwa Kalemera, Jean Bosco Kasiam Lasion'kin François Lepira Bompeka, Benjamin Longo-Mbenza, Jean René M'buyamba Kabangu, Michel Lutete Kelani, Jody Mbuilu Pukuta & Nanoue Masolo Muze Kianu

University of Kinshasa Congo

Abstract- Background: The knowledge of the prevalence of hypertension (HTN), the frequency with which it is detected, treated and controlled, are essential data to understand the importance of this issue and define intervention or prevention strategies.

Aim: To determine the hypertension rate of prevalence, awareness, treatment, and control in Matadian adult population.

Methods: During this cross-sectional study carried out within a random sample of adults in Matadi, a Congolese South-west port city, a total of 397 patients who fulfilled the inclusion criteria were enrolled to be interviewed and examined

GJMR-F Classification : NLMC Code: WG 340



Strictly as per the compliance and regulations of:



© 2015. Bernard Kianu Phanzu, Mpembele Mabaka Evelyne, Eleuthère Kintoki Vita, Jean Robert Makulo Risassi, Floriant Kiazayawoko Zola, Jean De Dieu Manyebwa Kalemera, Jean Bosco Kasiam Lasion'kin, François Lepira Bompeka, Benjamin Longo-Mbenza, Jean René M'buyamba Kabangu, Michel Lutete Kelani, Jody Mbuilu Pukuta & Nanoue Masolo Muze Kianu. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License <http://creativecommons.org/licenses/by-nc/3.0/>, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Rates of Hypertension Prevalence, Awareness, Treatment, and Control in a Congolese South-West Port City. The Influence of Gender According to Age Groups

Bernard Kianu Phanzu ^α, Mpenbele Mabaka Evelyne ^σ, Eleuthère Kintoki Vita ^ρ,
Jean Robert Makulo Risassi [§], Floriant Kiazayawoko Zola ^ζ, Jean De Dieu Manyebwa Kalemera ^δ,
Jean Bosco Kasiam Lasion'kin ^ω, François Lepira Bompeka ^θ, Benjamin Longo-Mbenza [¥],
Jean René M'buyamba Kabangu ^χ, Michel Lutete Kelani ^ν, Jody Mbuilu Pukuta ^ϕ
& Nanoue Masolo Muze Kianu ^δ

Abstract- Background: The knowledge of the prevalence of hypertension (HTN), the frequency with which it is detected, treated and controlled, are essential data to understand the importance of this issue and define intervention or prevention strategies.

Aim: To determine the hypertension rate of prevalence, awareness, treatment, and control in Matadian adult population.

Methods: During this cross-sectional study carried out within a random sample of adults in Matadi, a Congolese South-west port city, a total of 397 patients who fulfilled the inclusion criteria were enrolled to be interviewed and examined.

Results: HTN was identified in 162 (40.8%) participants. fifty eight (58%) participants with HTN were aware of the diagnosis, of whom 35 (37.2%) reported to take a blood pressure-lowering medications, with blood pressure control among 12 (34.2%) of those being treated. Women seem more aware of their condition than men before the age of 55 years. This trend was reversed after the age of 55 where men become more aware than women. The control rate is worse in hypertensive older women than among younger ones. An opposite situation was observed in men, in whom there is a better control of hypertension in older compared to younger.

Conclusion: This study found a high prevalence of HTN, as well as low percentage of HTN awareness, treatment, and control in Matadian population, highlighting the need for implementation of timely and appropriate strategies for prevention, diagnosis and control of this dreadful scourge.

1. INTRODUCTION

The scourge of the African continent [1], the silent killer [2-6], a time bomb [6] etc are all commonly used periphrasis to designate hypertension. They say a lot about the extent and gravity of this systemic disease in Africa more than elsewhere on the globe and nowadays more than ever in the history of hominids. Hypertension is indeed a major public health problem which the growing scales, particularly in Sub-Saharan Africa, challenges scientists, politicians and people and requires a concerted response. It is estimated that in 2013 hypertension was responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke [7].

While it is true that this scourge represents a real danger to humans, it is also true that this problem is vulnerable. Firstly, Large-scale epidemiological studies have clearly demonstrated the enormous impact of non-optimal blood pressure levels on the risks of major cardiovascular events in both higher- and lower-income regions [8-10]. On the other hand, the effects of blood pressure lowering with a range of drug therapies have been demonstrated in a large series of clinical trials [11-13]. The knowledge of the prevalence of hypertension (HTN), the frequency with which it is detected, treated and controlled, are essential data that are needed to understand the importance of this issue and define intervention or prevention strategies. Matadi, chief sea port city and provincial capital of Bas-Congo, one of the eleven provinces of the Democratic Republic of Congo, has never benefited from epidemiological studies to give figures for these parameters. Therefore, the objective of this study was to determine the rates of hypertension

Author α σ ρ δ χ ν : Department of Internal Medicine, Unit of Cardiology, University Clinics of Kinshasa Hospital, Kinshasa, Democratic Republic of Congo. e-mail: doctorkianu@gmail.com,

Author § θ : Department of Internal Medicine, Unit of Nephrology, University Clinics of Kinshasa, Kinshasa, Democratic Republic of Congo. *Author ζ :* Department of Internal Medicine, Unit of Infectious Diseases, University Clinics of Kinshasa, Kinshasa, Democratic Republic of Congo.

Author ω : Department of Internal Medicine, Unit of Endocrinology and Metabolism, University Clinics of Kinshasa, Kinshasa, Democratic Republic of Congo

Author ¥ : Faculty of Health Sciences, Walter Sisulu University, Mthatha, South Africa.

Author ϕ : Department of Family Medicine, University of Witwatersrand, Johannesburg, South Africa.

Author δ : Faculty of Medicine, University of Technology, Bel Campus, Kinshasa, Democratic Republic of Congo.

prevalence, awareness, treatment, and control in participants of the Matadi Cardiovascular Risk Survey (MACRIS).

II. MATERIALS AND METHODS

a) Study population

With the approval of protocol by the Ethics Committee of the School of Public Health, University of Kinshasa, DRC, and after obtaining the local administration permission and informed verbal consent from the target population according to the Helsinki Declaration II, a community-based cross-sectional study was carried out. This cross-sectional study involved a total of 397 apparently healthy Matadian adult (18 years and older) randomly selected from the two sanitary zones of the port city of Matadi (South west of DRC) with 306 053 inhabitants.

The sampling strategy was based on a multi-stage random sample. In the first, a cluster sampling considered each of the two health zones of the city of Matadi. In the second, a simple random sampling was carried out and allowed to sort four health areas in each health zone. In the third, a simple random sampling was also carried out by pooling two random avenues from each of the eight health areas. In the fourth, the even-numbered plots were selected in each avenue. In the selected plots, one household was randomly selected. Finally, one randomly selected adult was pooled from each selected household and was invited to participate in the study. Adult living the city of Matadi for less than one year were excluded from the study.

Data were collected from September 20 to October 20, 2014. The following clinical information was obtained from a questionnaire ad hoc: socio-demographic data (age, gender, marital status, education level, and religion), risk behavior (excessive alcohol consumption, cigarette smoking, physical inactivity), family and personal history (hypertension, diabetes mellitus). For each participant, previously trained investigators, all young doctors in professional internship in various hospitals in Matadi, measured body weight (kg), height (cm), waist circumference (cm), hip circumference (cm) and blood pressure (mmHg). Body weight was measured using scale Waagen GmbH Co. Soenle, Murrhardt, German manufacturers. Age, gender, marital status, education level, religion, alcohol consumption, cigarette smoking, physical activity, family and personal history were filled in by self-report declaration. Body weight was recorded to the nearest 0.1 kg using an electronic beam balance scale. The patient was barefoot, lightly clad, standing motionless at the center of the weighing pan, upper limbs along the body; the body weight is evenly distributed on both feet. Height was measured to the nearest 1 mm using a standardised wallmounted height board; the patient being barefoot standing heels together, head positioned so that the line of sight is perpendicular to the body.

Head, back, buttocks and heels were in contact with the vertical board of the toise. The participant took a deep breath and remained in this extended position while the cursor was brought into contact with the highest point of the head, pressing it to compress the hair. The body mass index (BMI) was calculated as weight (kg)/squared height (m). The waist circumference was measured; the participant was standing, with feet apart at about 25 cm, using a tape put through the umbilicus and halfway between the grid rib and the iliac crest. The measurement was taken at the end of expiration and it was recorded to the nearest millimeter. The hip circumference was measured under the same conditions; the ribbon was put through the widest part of the basin. Sitting blood pressure (BP) was measured non-invasively on the left arm, using an automated oscillometric BP recorder OMRON M6 worn cuff at heart level, the patient being seated for 5 minutes. An average of three consecutive shots each separated by three minute interval was chosen.

b) Operational definitions

Hypertension was defined as individuals with self-reported history of hypertension or with an average of 2 blood pressure measurements of at least 140/90mmHg using an automated digital sphygmomanometer. Awareness was based on self-reports. Treatment was based on the regular use of blood pressure-lowering medications. Control was defined as individuals with blood pressure lower than 140/90mmHg.

c) Statistical analyses

The collected data were encoded on EPIINFO 7 and exported to a Microsoft Excel sheet 2010 for cleaning and to check its consistency and quality, thus served as a database and were analyzed using SPSS Version 20.0 software.

The statistics used to describe the variables were the mean \pm standard deviation for continuous quantitative variables with symmetric distribution, the median with interquartile range (IQR) for those with a non-Gaussian distribution. Categorical variables were described as relative frequency (%) and / or absolute (n).

For the analysis, comparison of means was performed with the Student t test or t test for variances, the median with the nonparametric Wilcoxon / Mann Whitney. The Pearson Chi-square or Fisher's exact test, as appropriate, was used to compare proportions.

III. RESULTS

A total of 397 participants attended the survey, 105 (26.4%) were from the rural areas while 292 (73.6%) were from the urban areas, 144(36.3%) were men while 253(63.7%) were women, the mean age was 41.2 ± 16.5 years. Respondents came in equal proportion from both

healthcare areas (50.1% of the Nzanza health area and 49.9% of Matadi health area). Two groups of respondents were constituted; the first was made of all respondents without hypertension (235 or 59.2%) and group 2 was made of hypertensive respondents (162 or 40.8%). Table 1 presents the general characteristics of the study population as a whole and stratified by the

hypertension status. Hypertensive participants tended to be older and married; and marital status was associated with hypertension ($p < 0.0001$). They were more likely to belong to the Catholic Church and the Protestant Church. No difference has been noted between the two groups regarding the gender and the occupation.

Table 1: General Characteristics of the study population as a whole and stratified according to the hypertensive status

Characteristics	Whole group (n=397)	Non hypertensive (n=235)	hypertensive (n=162)	p
Gender				0.280
Men	144(36.3)	82(34.9)	62(38.3)	
Women	253(63.7)	153(65.1)	100(61.7)	
Age				<0.0001
Mean \pm SD. (years)	41.2 \pm 16.5	34.6 \pm 12.2	50.9 \pm 17.2	
<25	64(16.1)	53(22.6)	11(6.8)	
25 - 34	104(26.2)	79(33.6)	25(15.4)	
35 - 44	85(21.4)	59(25.1)	26(16.0)	
45 - 54	47(11.8)	22(9.4)	25(15.4)	
\geq 55	97(24.4)	22(9.4)	75(46.3)	
Health Zone				0.225
Nzanza Health Zone	199(50.1)	122(51.9)	77(47.5)	
Matadi Health Zone	198(49.9)	113(48.1)	85(52.5)	
Profession				NS
House wife	142(35.8)	81(34.5)	61(37.7)	
Independent	117(29.5)	69(29.3)	48(29.6)	
Un employed	52(13.1)	27(11.5)	25(15.4)	
Business agent	50(12.6)	27(11.5)	23(14.2)	
Student	29(7.3)	27(11.5)	2(1.2)	
Farmer	7(1.8)	4(1.7)	3(1.8)	
Marital status				<0.0001
Married	227(57.2)	130(55.3)	97(59.9)	
Unmarried	116(29.2)	90(38.3)	26(16.0)	
Widower	43(10.8)	7(3.0)	36(22.2)	
Divorcee	11(2.8)	8(3.4)	3(1.9)	
Province of origin				0.400
Bas Congo	381(96.0)	224(95.3)	157(96.9)	
Other province	16(4.1)	11(4.7)	5(3.0)	
Religion				<0.0001
Revivalist church	120(30.2)	89(37.9)	31(19.1)	
Protestant Church	99(24.9)	53(22.6)	46(28.4)	
Catholic Church	87(21.9)	33(14.0)	54(33.3)	
Other religion	48(12.1)	34(14.5)	14(8.6)	
No religious belief	22(5.5)	13(5.5)	9(5.6)	
Kimbanguist	21(5.3)	13(5.5)	8(4.9)	

Hypertension was identified in 162 (40.8%) participants. fifty eight (58%) participants with hypertension were aware of the diagnosis, of whom 35 (37.2%) reported to take a blood pressure-lowering medications, with blood pressure control among 12 (34.2%) of those being treated. The rate of HTN awareness, treatment and control varied according to age. The rate of hypertension awareness that is less

than 10% before the age of 55, but it is rapidly improving to 30% from 55 years. This is illustrated in figure 1.

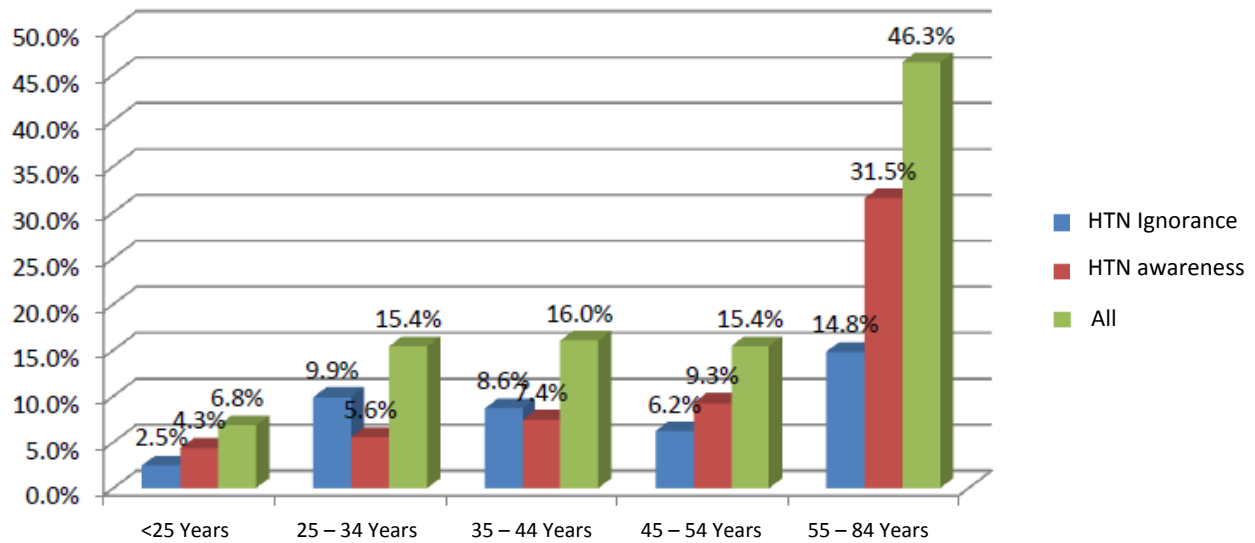


Figure 1 : Awareness of hypertension according to the age

Figure 2 shows that before the age of 55, the rate of awareness is better in women. But after this age the rate becomes better in men, although a significant

improvement of this knowledge is also seen in women after 55 years.

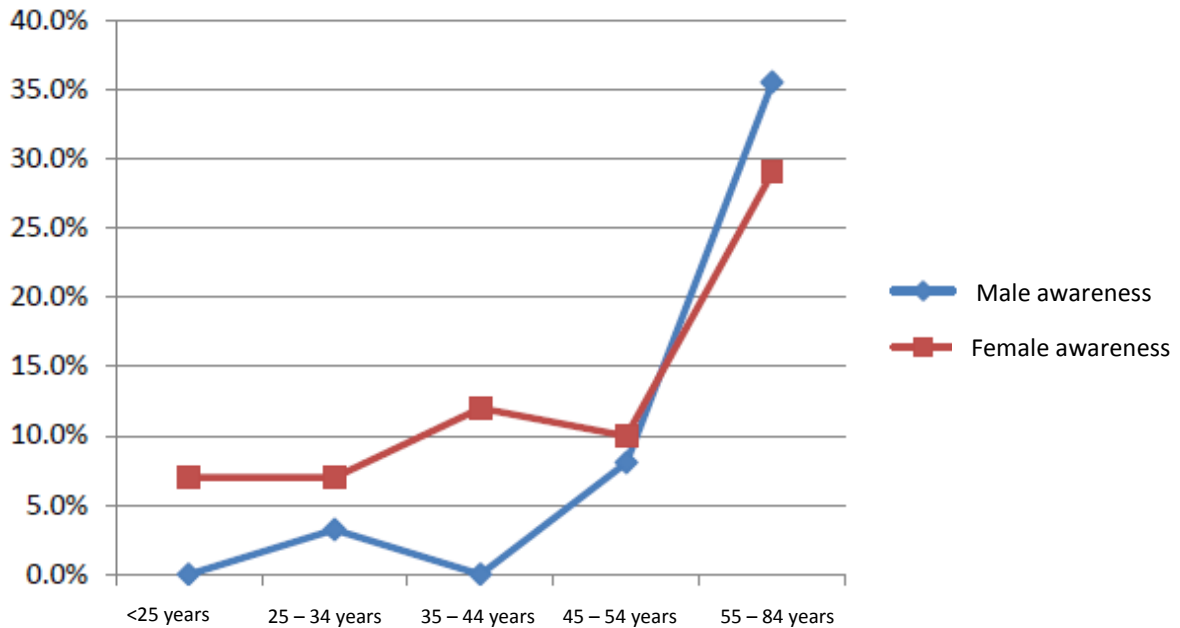


Figure 2 : Trends of the awareness rate according to sex, with aging

The control rate is worse in hypertensive older women than among the younger ones. An opposite situation is observed in men, in whom there is a better control of hypertension in older men compared to the younger ones. This is illustrated in Figure 3.

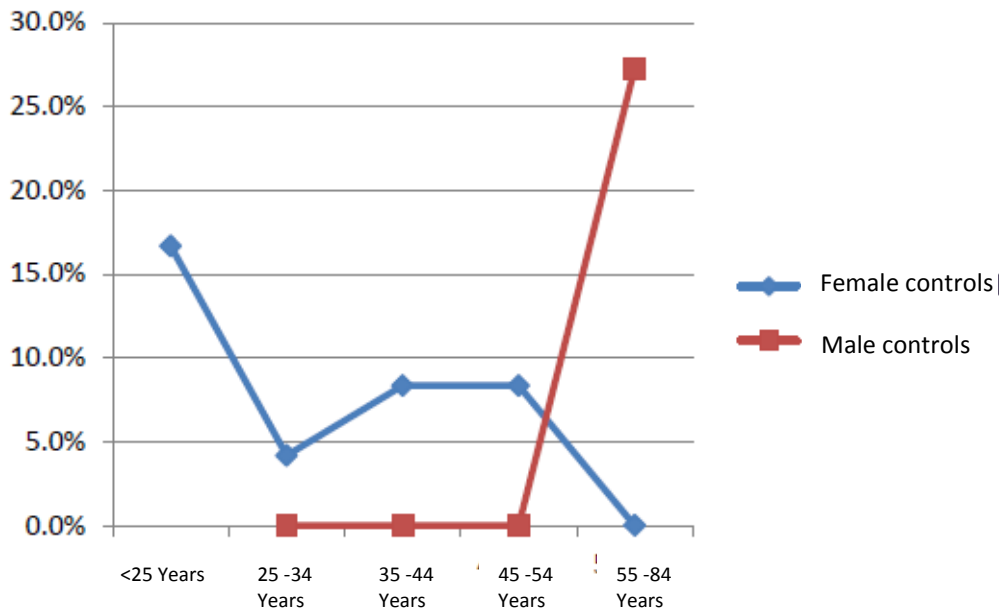


Figure 3: Trends of the control rate according to sex, with aging

IV. DISCUSSION

The interest of the issue of the prevalence, awareness, treatment and control of hypertension justifies the large number of publications that exist on the subject. All these publications agree that in Sub-Saharan Africa, more than elsewhere, high blood pressure is under-diagnosed, under-treated and poorly controlled. In DRC the available population based, epidemiological studies on hypertension have been held Kinshasa and its environs [14-16], in the west of the RDC, and more recently in South Kivu [17] in the eastern part of the country. These studies showed that the prevalence of hypertension deepened year to year and was higher in urban than in rural areas, contrary to what had been observed several decades ago. These previous studies have also shown, as elsewhere in sub-Saharan Africa, low rate of hypertension awareness, treatment, and an even lower rate of hypertension control. Since the trend of hypertension and other risk factors of cardiovascular disease are changing because of the growing urbanization and related lifestyle changes in sub-Saharan Africa, and since the city of Matadi has never benefit from epidemiological study on hypertension, this study was required and cannot be regarded as excessive.

It is well known that the prevalence of hypertension varies with the considered age range. It is also well known that women are less likely to have high blood pressure than men before the age of 55 and after trends are equalized before reversing. But to the best of our knowledge, this study is the first to show that the gender related differences in the rate of awareness and control also varied with the considered age group.

a) General characteristics

The present study showed that hypertensive patients tend to be older. This is in agreement with virtually all previous studies, they were in-hospital or population-based. It is indeed long been known that advanced age was the main risk factor for high blood pressure. This is attributed to the aging process of the arteries. This study also found that hypertensive patients were more often married. The major responsibilities brought by marriage and psychosocial stress that follows would be the explanation. However a confounding factor such as age could also explain this, since in general the married are older than the unmarried. That members of the Catholic and Protestant religions are often hypertensive than those of other religions including revivalist churches could be explained by the fact that there would be more solidarity, more faith and therefore more inner peace and less psychosocial stress among the followers of these religions. But again, the existence of confounding factors must be postulated, and these findings need to be confirmed in the larger survey.

b) Prevalence and awareness

The prevalence of hypertension found in this study is 40.8%. The same prevalence has been found by Katchunga et al [17] in South Kivu province in eastern DRC. The distribution of the prevalence in urban and rural areas is also consistent with the results of Katchunga et al. [17]. Aside from some studies that have focused on older populations, the prevalence found in this study is the largest ever reported in sub-Saharan Africa. Would the DRC be the epicenter of the epidemic of hypertension in sub-Saharan Africa? Fifty Eight percent of the hypertensive participants were



aware of their hypertensive status before the surveys. This is consistent with the Katchunga et al. findings [17]. Considering a recent meta-analysis which found a rate of awareness of hypertension between 7% and 56% in sub-Saharan Africa [18], this rate of awareness is one of the best ever reported in sub-Saharan Africa. Only Awoke et al. in North-West Ethiopia (63%) [19] and Bovet, from a national wide survey in Seychelles (65%) [20] reported a higher rate of awareness of hypertension. However, considering the fact that 42% of hypertensive patients were unaware of their condition before the study, we consider that there is still much outreach work to be done. The sensitization should not only target individuals but also the health care professional who need to seize the opportunity of each consultation to measure patient's blood pressure. This study also showed that the prevalence of hypertension increases before age 35, is stabilized between 35 and 54 years and then majored considerably after 55 years. The rate of awareness follows the same trend, but with a disparity between the sexes. In fact, women seem more aware of their condition than men before the age of 55 years. This trend was reversed after the age of 55 where men become more aware than women. Somatic and psychological changes inherent in menopause [21] would they be the basis for a relaxation of attention or disinterest which would explain the decline in the awareness of hypertension at this age? It has been demonstrated that over time women's sense of control declines more than men's [22].

c) Treatment and control

This study found a low rate of treated patients (37.2%) and an even lower rate of control in treated hypertensive patients (34.2%). This is a common situation around the world. But all authors agree that the situation in sub-Saharan Africa is more dramatic than in other regions. Rather than the "law of halves" which is generally observed in Western countries, this study showed that here, it is the "law of thirds " that prevails when considering the rate of treated and controlled hypertensive persons. This contrast between Western trends and trends in Africa and especially sub-Saharan Africa will intensify in future years. Indeed, while the 2013 guidelines of the French Society of Arterial Hypertension advocates improving hypertension control from 50% to 70%, an objective expected to be achieved in 2015 [23], (there is a comma, not a full stop) in sub-Saharan Africa, the rate of hypertension treatment and control are consistently below 50%. The high rate of uncontrolled hypertension overshadows either a non-optimal management, or a poor adherence. It is as a result of incompetence of the attending physician or the patient's lack of discipline, or both. While there are certainly rare complex cases where, despite the competence and patient adherence, high blood pressure remains uncontrolled. This is also an intrinsic

characteristic of HTN in blacks to be difficult to control. But poverty in this region has some responsibility, since it decreases the patient's accessibility to health care. In sub-Saharan Africa, overall, 18% of individuals with hypertension were receiving treatment across the studies [18]. The treated hypertensive rates found in this study (37.2%) exceeds this rate. As for the 34.2% control rates found in this study, it is one of the best ever reported in sub-Saharan Africa. Only Damasceno et al. (39%) [24] reported a higher control rate than the one we found. These figures on the treatment and control rate are quite flattering when compared to figures found elsewhere in sub-Saharan Africa. But they are meager when compared to those found in North Africa or in the Western, and when considering the consequences it can have on the morbidity and mortality of these patients with uncontrolled hypertension. In DRC, Katchunga [17] reported 13% of controlled hypertension. The post-war situation in the province of South Kivu and the consequences this has had on the organization of health services can explain this difference between two geographical sites of the same country. Further studies are needed to understand the reasons for the better treatment and control rate profiles observed in the city of Matadi on the figures found in other sub-Saharan studies. Improving this grim picture of low rate of awareness, treatment and control of hypertension calls for the involvement of several actors such as attending physicians (patient sensitization and evidence-based optimal treatment) patients themselves (strict compliance with lifestyle changes and good adherence to medical treatment) government (regulatory of cooking salt intake and physical activity) and media (information on risks of too much salty food, too much fat and a sedentary lifestyle).

Our findings should be interpreted in the light of certain limitations including the office blood pressure rather than the ambulatory blood pressure or Self-measurement of blood pressure.

V. CONCLUSION

This study found a high prevalence of HTN, as well as low percentage of HTN awareness and treatment. As described elsewhere, despite the availability of a wide selection of effective antihypertensive treatments and the existence of clear treatment guidelines, many patients with hypertension do not have controlled blood pressure [18]. As a balance with the center of inertia represented by the age of 55, female hypertensive are more aware than male hypertensive before the age of 55, male are more aware than female after 55 years. Female after 55 are less well controlled than male, male before age 55 are less well controlled than female. It is time to consider and organize a coordinated response where doctors, patients, policymakers, the media, in short everyone, should play an active role.

VI. ACKNOWLEDGMENT

The authors sincerely thank all patients who agreed to participate in this study. Warm thanks also to the young doctors who enthusiastically participated in this study, as well as political and administrative personalities who facilitated our task.

REFERENCES RÉFÉRENCES REFERENCIAS

1. Bernard KianuPhanzy BL-M, Jean BoscoKasiam Lasion'kin, Jody, MbuiLuPukuta EKV, and Nanoue MasoloMuzekianu, 2014. What Are the Determinants of Insulin Resistance (IR) and How Effective Is the Sub-Saharan Africa-Specific Threshold of Abdominal Obesity (AO-SSA) Identifying IR in Congolese Black Hypertensive Patients? *World Journal of Cardiovascular Diseases*; 4:13.
2. Hoel D, and Howard RB, 1997. Hypertension: stalking the silent killer. *Postgraduate medicine*; 101(2): 116-121.
3. Moore J, 2005. Hypertension: catching the silent killer. *The Nurse practitioner*, 30(10):16-18, 23-14, 26-17 passim; quiz 36-17.
4. Rapport RS, 1999. Hypertension: Silent killer. *New Jersey medicine: the journal of the Medical Society of New Jersey*; 96(3): 41-43.
5. Bhosale VV, Inamdar SC, VB Karande, SR Burute, MBMurthy, A Ghatok, 2014. Beneficial effects of nebivolol in comparison with atenolol on safety and tolerability in essential hypertension. *Journal of Clinical and Diagnostic Research: JCDR*; 8(6):Hc01-04.
6. Khan MU, Shah S, and Hameed T, 2014. Barriers to and determinants of medication adherence among hypertensive patients attended National Health Service Hospital, Sunderland. *Journal of Pharmacy & Bioallied Sciences*; 6(2): 104-108.
7. Mendisi S, 2013. Hypertension: a silent contributor to the global cardiovascular epidemic. *Regional Health Forum*; 17(1): 6.
8. Yusuf S, Reddy S, Ounpuu S, and Anand S, 2001. Global burden of cardiovascular diseases: part I: general considerations, the epidemiologic transition; risk factors, and impact of urbanization. *Circulation* 104(22): 2746-2753.
9. MacMahon S, Peto R, Cutler J, Collins R, Sorlie P, Neaton J, Abbott R, Godwin J, Dyer A, and Stamler J, 1990. Blood pressure, stroke, and coronary heart disease. Part 1, Prolonged differences in blood pressure: prospective observational studies corrected for the regression dilution bias. *Lancet* 335(8692): 765-774.
10. Lewington S, Clarke R, Qizilbash N, Peto R, and Collins R, 2002. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. *Lancet*, 360(9349): 1903-1913.
11. Bloch MJ, and Basile JN, 2009. Largest meta-analysis to date suggests that patients at risk for cardiovascular disease events derive benefit from antihypertensive therapy regardless of baseline blood pressure and to reduce vascular events, lowering blood pressure is more important than choice of antihypertensive drug class. *Journal of Clinical Hypertension (Greenwich, Conn)*; 11(12): 743-745.
12. Sundstrom J, Arima H, Jackson R, Turnbull F, Rahimi K, Chalmers J, Woodward M, and Neal B, 2015. Effects of Blood Pressure Reduction in Mild Hypertension: A Systematic Review and Meta-analysis. *Annals of internal medicine*; 162(3): 184-191.
13. Law MR, Morris JK, and Wald NJ, 2009. Use of blood pressure lowering drugs in the prevention of cardiovascular disease: meta-analysis of 147 randomised trials in the context of expectations from prospective epidemiological studies. *BMJ (Clinical Research ed)*, 338: b1665.
14. Mwasa Pascal Bayauli J-RMB-K, Daniel Lemogoum, Robert Fagard, Jean Paul Degaute, Mpandamadi Symphorien Ditu, Bompeka François Lepira, and Jean-René M'Buyamba-Kabangu, 2014. Prehypertension, Hypertension and Associated Cardiovascular Risk Factors among Adult Congolese Urban Dwellers: Results of the Vitaraa Study. *World Journal of Cardiovascular Diseases*, 4:9: 390-398.
15. Longo-Mbenza B, Ngoma DV, Nahimana D, Mayuku DM, Fuele SM, Ekwanzala F, and Beya C, 2008. Screen detection and the WHO stepwise approach to the prevalence and risk factors of arterial hypertension in Kinshasa. *European Journal of Cardiovascular Prevention and Rehabilitation: Official Journal of the European Society of Cardiology, Working Groups on Epidemiology & Prevention and Cardiac Rehabilitation and Exercise Physiology*, 15(5): 503-508.
16. Kasiam Lasi On'kin JB, Longo-Mbenza B, Nge Okwe A, and Kangola Kabangu N, 2007. Survey of abdominal obesities in an adult urban population of Kinshasa, Democratic Republic of Congo. *Cardiovascular Journal of Africa*, 18(5): 300-307.
17. Katchunga PB, M'Buyamba-Kayamba JR, Masumbuko BE, Lemogoum D, Kashongwe ZM, Degaute JP, Kabinda JM, and M'Buyamba-Kabangu JR, 2011. [Hypertension in the adult Congolese population of Southern Kivu: Results of the Vitaraa Study]. *Presse Medicale (Paris, France)*; 140(6): e315-323.

18. Ataklte F ES, Kaptoge S, Taye B, Echouffo-Tcheugui JB, and Kengne AP, 2015. Burden of undiagnosed
19. Awoke A, Awoke T, Alemu S, and Megabiaw B, 2012. Prevalence and associated factors of hypertension among adults in Gondar, Northwest Ethiopia: a community based cross-sectional study. *BMC Cardiovasc Disord*; 12:113.
20. Bovet P, 1995. The epidemiologic transition to chronic diseases in developing countries: cardiovascular mortality, morbidity, and risk factors in Seychelles (Indian Ocean). Investigators of the Seychelles Heart Study. *Sozial- und Praventivmedizin*; 40(1): 35-43.
21. Nappi RE, and Lachowsky M, 2009. Menopause and sexuality: prevalence of symptoms and impact on quality of life. *Maturitas*; 63(2): 138-141.
22. Catherine E, and Ross JM, 2002. Age and the Gender Gap in the Sense of Personal Control. *Social Psychology Quarterly*; 65(2): 21.
23. Blacher J HJ, Hanon O, Mourad JJ, Pathak A, Schnebert B, and Girerd X, 2013. Management of arterial hypertension in adults: 2013 guidelines of the French Society of Arterial Hypertension. *Sang Thrombose Vaisseaux*; 5(25): 9.
24. Damasceno A, Azevedo A, Silva-Matos C, Prista A, Diogo D, and Lunet N, 2009. Hypertension prevalence, awareness, treatment, and control in mozambique: urban/rural gap during epidemiological transition. *Hypertension*; 54(1): 77-83.