Global Advanced Research Journal of Microbiology (ISSN: 2315-5116) Vol. 2(4) pp. 080-085, April, 2013
Available online http://garj.org/garjm/index.htm

Full Length Research Paper

Blood pressure characteristics among slum dwellers in Kenya

Kevin W. Ongeti, Julius A. Ogeng'o, Anne N. Pulei, Beda O. Olabu, Catherine N. Gakara

Department of Human Anatomy, University of Nairobi, School of Medicine, PO Box 30197 00100 Nairobi.

Accepted 10 April, 2013

Objectives: To assess the blood pressure characteristics of dwellers of Kibera slum. Design: Descriptive crossectional study Setting: Kibera slum, Nairobi, Kenya. Patients and Methods: The blood pressure, resting pulse rate and BMI was assessed among 400 dwellers of Kibera slum in Nairobi, Kenya. The data collected was analysed for frequency and means using a statistical program SPSS. Results: The mean blood pressure was 122/71mmHg. Systolic blood pressure was higher in males than in females (p=0.001). Fifty two (13%) participants, 17.8% of males and 11.1% of the females were hypertensive. Outstanding factors associated with hypertension included male gender (p=0.001), a body mass index (BMI) > 25 and increasing age. Seven of the patients knew they were hypertensive and 5 were on antihypertensive therapy. Conclusions: Prevalence of hypertension in these urban slum dwellers is comparable to that reported in rural settings elsewhere in Africa. There is need for public education concerning management of BMI and hypertension starting early in life and regular screening of people at risk in the urban slum dwellings.

Keyword: Hypertension, Urban Slum, Kenya.

INTRODUCTION

At the beginning of the 20th century, high blood pressure was virtually non-existent among the indigenous Kenyans and other African populations (Lore 1993). Currently, hypertension is emerging as an important public health problem in sub-Saharan Africa (Cooper et al., 1998; Edwards et al., 2000). The prevalence of hypertension is high among people of African origin compared to Whites independent of BMI, with a younger age at onset among people of African descent (Brown et al., 2009; Brown 2006). It also shows geographical differences in distribution, with urban centres being worse affected compared to rural settings (Lore 1993). Hypertension is a known risk factor for stroke, heart failure and end stage renal disease among Africans (Cappuccio et al., 2004). It is also a major non-infective factor in the high mortality of adults in sub-Saharan Africa (Ogeng'o et al., 2001). To achieve a meaningful reduction in morbidity and mortality, management of patients with existing hypertension must be coupled with treatment and prevention of major modifiable risk factors (Whelton 1996). Risk factors for hypertension are increasing among African urban populations (Mathenge et al., 2010). There is a positive correlation between blood pressure (BP), urbanization, age, and gender (Cappuccio et al., 2004; Amoah 2003). The extent of

*Corresponding Author's Email: kongeti@aol.com

these risk factors, including the BMI in an urban poor population is largely unknown. Two studies have described the prevalence of hypertension in Mombasa and Nakuru cities in Kenya (Mathenge et al., 2010; Jenson et al., 2011). Both studies failed to isolate the slum populations in Kenyan towns. Data from these populations nonetheless are important to inform healthcare planning for the slum dwellers. We therefore undertook a cross-sectional epidemiologic survey in the catchment areas of a health centre in Kibera slum, Nairobi, Kenya.

PATIENTS AND METHODS

This study was conducted on dwellers of Kibera slum in Nairobi, Kenya, between January and June 2011. Kibera slum is the most populated slum in Africa with an estimated population of one million people mainly from the low socio-economic status natives of mixed backgrounds who consume low calorie diets and are manual labourers. Approval for the study was granted by the Kenyatta National Hospital/University of Nairobi ethical and research committee. The investigating group consisting of a doctor, clinical officers, nurses and community health workers set up a data collection centre in Kibera slum community clinic. This was as a part of community-based study of the prevention of infectious diseases and non-communicable diseases in the same region. Four hundred random volunteers aged 14 to 75 yrs from Kibera slum, Nairobi were included in this study. Pregnant women and those with recent stressors such as bereavement and accidents were excluded. Age, gender, height, BMI and past medical history were recorded on data sheets. Height was measured without shoes, using a wooden platform and a height rule, to the nearest 0.5 cm. Weight was measured to the nearest 0.5 kg with manual Weiss® scales after the participants had removed their outer garments and footwear. Blood pressure (BP) and resting pulse rate (RPR) were measured after the participant had been sitting upright for at least 5 minutes with an automatic machine (Medisana®, Blutdruck-messgerat, Medisana Ag, Germany) (Brown et al., 2009). The appropriate cuff size; 12x22 cm (small adult cuff) or 16x30 cm (adult cuff) and 16 x 36 cm (large adult cuff)] were used. Two readings were taken 2 minutes apart. If the second value was more than 5 mmHg different from the first, continued measurements were made until a stable value was attained (Bailey et al., 1993). The mean of the last two readings was used in the analysis. It was also noted whether a participant was aware of their hypertensive status, dangers of hypertension and regular antihypertensive drug therapy.

Systolic blood pressure was categorised into <120, 120-139, 140-159 and $\geq$160. Diastolic blood pressure was classified into <80, 80-89, 90-99 and $\geq$100. Age was stratified into 10yr groups namely; 10-19, 20-29, 30-39, 40-49, 50-59, 60-69 and 70-79. Hypertension was defined as a systolic BP $\geq$140 mmHg and/or a diastolic BP $\geq$90 mmHg or being on a regular drug therapy for hypertension (Cappuccio et al., 2004). Data collected was analysed using Statistical Package for Social Sciences (SPSS) for windows version 18.0 Chicago Illinois 2010. The student T test was used to compare gender and age group mean differences in blood pressure and BMI. A p value of $P<0.05$ was considered significant (Eng 2003).

RESULTS

Four hundred (119 males and 281 female) participants between 14 to 75yrs of age were analysed (Figure 1). The mean age was 32$\pm$11 years with a median of 28 years (Table 1). Fifty two (13%) participants were hypertensive. These comprised of 31 females and 21 males. The youngest hypertensive patient was 17 years while the oldest was 75 years (Figure 2). The mean age of hypertensive patients was 37$\pm$15 years. Fourteen patients had a diastolic pressure of 90- 99 while 4 of them had a diastolic pressure of $\geq$100. Seven (13%) patients knew they were hypertensive, and five (10%) of them were using antihypertensive drugs. The mean systolic blood pressure was higher in males (p= 0.001) whereas the diastolic was vice versa (p=0.432), and these values increased with age (Figure 1 and 3). The RPR was also noted to be significantly higher in females (p=0.006). The BMI ranged from 15.22 to 41.90 with a mean of 23.44, and was lower in males (p=0.000). Individuals <40 years had a lower BMI than individuals >40 years; 22.81 versus 25.93, (p=0.000). Hypertensive participants had a higher BMI (26.67) than the normotensive ones (23.02), (p = 0.000) (Table 2).

DISCUSSION

Observations from the present study support published data from other African countries which suggest that there is a high prevalence of hypertension among Africans (Cappuccio et al., 2004; Mathenge et al., 2010; Giles et al., 1994). These studies have additionally shown a higher prevalence of hypertension in African urban areas than in rural areas (Cooper et al., 1997). The 13% prevalence of hypertension in slum dwellers in the present study than the 30% reported urban figures is comparable to the 14% observations

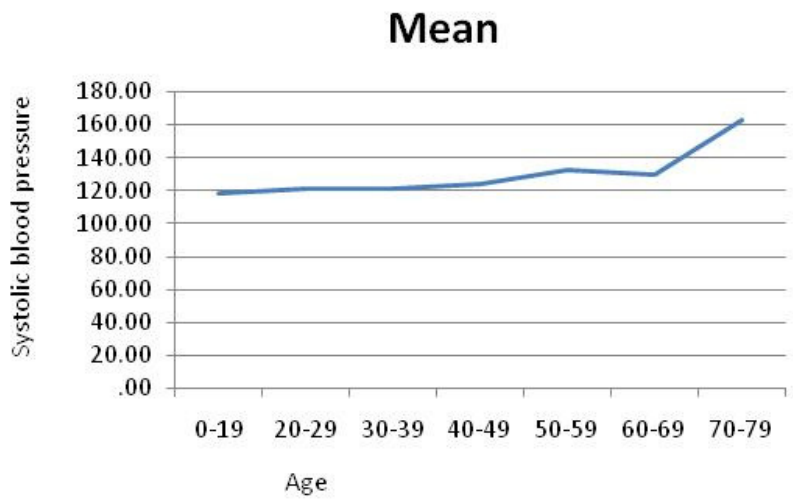

Figure 1. Systolic blood pressure with age

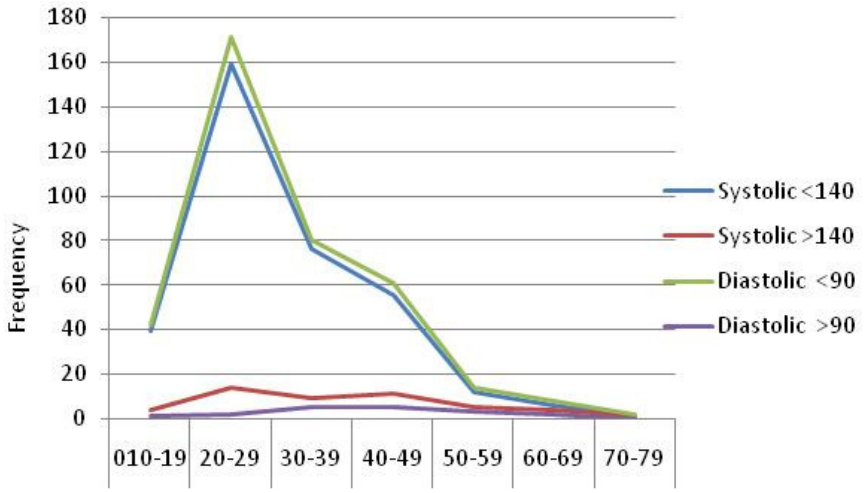

Figure 2. Age distribution of normotensive and hypertensive participants

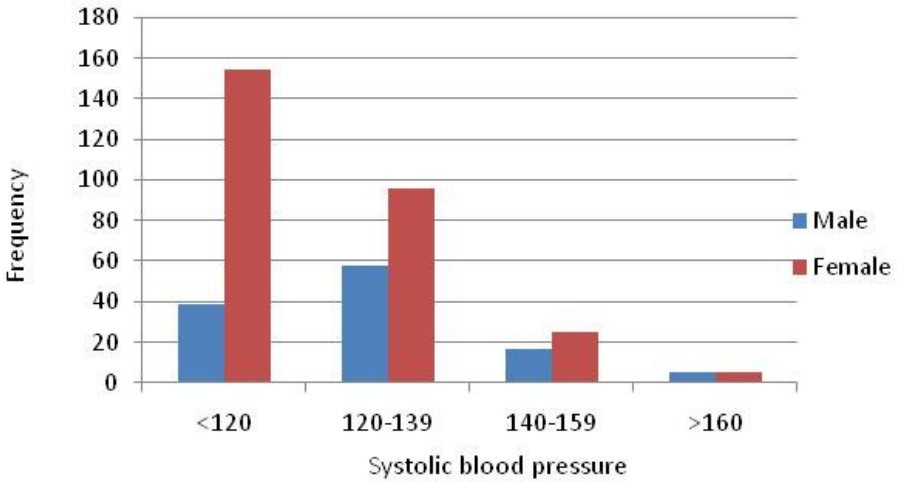

Figure 3. Systolic blood pressure in males and females

Table 1. Comparison between BMI with age systolic BP, diastolic BP and pulse

Variable		Gender		Total/Overall	p-value
		Male	Female		
Count		119	281	400	
Pulse Rate (bpm)		82±18	87±15	86±16	0.006
Systolic BP (mmHg)		126	120	122	0.001
Diastolic BP (mmHg)		70	71		0.432
BMI	<25	100	181	281	
	>25	19	100	119	
	Mean	21.72	24.17	23.44	0.000

Table 2. Comparison between BMI with age systolic BP, diastolic BP and pulse

	BMI	Mean	SD	P value
Age	<25	29	11	0.00
	≥25	37	12	
Systolic BP	<25	120	14	
	≥25	128	19	
Diastolic BP	<25	70	10	
	≥25	75	11	
Pulse	<25	86	17	0.59
	≥25	85	14	

Table 3. Comparison of hypertension prevalence in various African populations

Study	**Country**	**Setting**	**% hypertension**
Cappucio et al., 2004	Ghana	Urban	28.7%
Cooper et al., 1997	Nigeria	Rural	14.5%
Cooper et al., 1997	Cameroon	Rural	16.9%
Cooper et al., 1997	Black Americans	Urban	32.6%
Edwards et al., 2000	Tanzania	Urban/rural	38%
Jenson et al., 2011	Kenya	Urban	32.6%
Mathenge et al.,2010	Kenya	Urban	50%
Giles et al., 1994	Liberia	Rural	12.5%
Suriyawongpaisal and Underwood, 1993	Thailand	Slums	14%
Present study	Kenyan	Urban Slum	13%

made in the rural Africa and Thai slums (Giles et al., 1994; Suriyawongpaisal et al., 1993; Bailey et al., 1993). (Table 3). We attribute these observations to the fact that most slum dwellers have very low incomes, consume low calorie diets and are generally manual labourers. Urbanization may therefore not impact significantly on the lifestyle of urban slum dwellers, limiting its effects on arterial blood pressure.

As seen in other African populations, hypertension in this sample was influenced by increasing age, gender and high BMI (Lore 1993; Cappuccio et al., 2004). The youngest hypertensive was 17 years old, confirming that hypertension sets in early in the life Africans (Jenson et al., 2011). However, most hypertensive patients were forty years and older. The disproportionate distribution of the sampled population

impaired in depth analysis of age group differences in hypertension. Hypertension was higher among males than females as seen in some Ghanaian and Cameroonian populations (Edwards et al., 2000; Cooper et al., 1997, Giles et al., 1994). Association between hypertension and gender is still unclear in many sub-Saharan African settings (Cappuccio et al., 2004). In some of these populations females are worse affected while the converse occurs in others (Cappuccio et al., 2004; Cooper et al., 1997). In concurrence with previous observations, high BMI in females was accompanied by elevated RHR and diastolic blood pressure (DBP) and systolic blood pressure (SBP) (Franklin et al., 2001; Cook et al., 2006). The significance of DBP in cardiovascular risks remains controversial (Suriyawongpaisal et al., 1993). In the Framingham study, amongst the middle aged and the elderly, the cardiovascular risk was inversely related to DBP at any given SBP over 120mm Hg., much of which was attributed to changes in the pulse pressure (Franklin et al., 2001). Solely, the RHR is considered an important predictor of cardiovascular risks in individuals with underlying cardiac disease (Martin et al., 2004). Present data also suggests that increasing age above 40 yrs is associated with overweight and hypertension.

In concurrence with evidence from several African populations and Thai slums, less than half of the hypertensive patients were aware of their condition (Amoah 2003; Suriyawongpaisal et al., 1993). Even a lower proportion of them of were under hypertension treatment. Therefore, the prevalence, awareness and treatment results discussed above have important implications both for clinicians and public health professionals. First, people living in slums have a high risk of developing hypertension (Whelton et al., 2004). Secondly, hypertension is rising in Sub Saharan Africa with very little prominence being given to public education especially in the low income settlements (Cooper et al., 1997). Furthermore, the results indicate that awareness and treatment of hypertension in urban slum dwelling is inadequate. Generally, in developing countries, prevalence of hypertension appears to be rising rapidly and the societal response is fragmented with very low levels of awareness, treatment and control (Whelton et al., 2004). This is worse in the densely populated poor urban dwellings. Limitations of the present study include an overall small sample of the participants and a lower number of male participants. Nonetheless, this sample gives a unique view of hypertension in an African urban population with very limited resources, in which healthcare is largely neglected, especially by men (Cooper et al., 1997).

In conclusion, Prevalence of hypertension in these urban slum dwellers is comparable to that reported in rural settings elsewhere in Africa. There is need for public education concerning management of BMI and hypertension starting early in life and regular screening of people at risk in the urban slum dwellings.

Conflict of interest: None

External Funding: None.

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