The burden of hypertension and its associated factors among adults in Ruvuma, Southern Tanzania

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Introduction: The prevalence of non-communicable diseases, and hypertension in particular, has been increasing.

Objective: To determine the prevalence and associated factors for hypertension among adults in Ruvuma, Southern Tanzania.

Methods: A cross-sectional study was conducted from September to October 2017; 802 patients were recruited, and data were collected on demographic, behavioural and clinical characteristics, and blood pressure, which were analysed using SPSS version 24.0. Associations and statistical significance were calculated using Odds ratio at 95% CI, and p-values of <0.05 were considered statistically significant.

Results: Overall, prevalence of hypertension (systolic blood pressure ≥140 and/or diastolic blood pressure ≥90 mm Hg, or known hypertensive patient on treatment) was 20.4% (21.4% and 19.5% in women and men, respectively) and that of pre-hypertension was 35.9%. Hypertension was associated with increasing age (p=0.01), excessive salt consumption (p<0.0001), and history of hypercholesterolemia (p<0.0001).

Conclusions: The prevalence of hypertension and pre-hypertension are relatively high. Intervention measures to prevent and control the disease are mandatory to prevent its progression and reduce morbidity and mortality.

Keywords: Hypertension; pre-hypertension; associated factors; prevalence

INTRODUCTION

The burden of non-communicable diseases is increasing in developing countries.[1,2] The World Health Organization estimates that by 2030, non-communicable diseases may cause up to46 % of deaths in sub-Saharan Africa.[2] Hypertension is a major modifiable risk factor for cardiovascular disease (CVD) and premature mortality.[3] Sub-Saharan Africa has more than 75 million hypertensive individuals and by 2025 it is estimated that about 125.5 million people will be affected.[4] The prevalence of hypertension varies between and within countries [5], in Tanzania, it varies from 16.4% in the west [6] to 28.0% in the north.[7]

The lifestyles of populations have changed with greater urbanization and economic growth. Many people exercise[7] less than previously while diets are often lower in fibre, but higher in salt, fat and calories. [8,9]

Little is known about the magnitude and determinants of hypertension in Southern Tanzania.

Objective

The objective of this study was to determine the burden of hypertension and assess associated factors among adults visiting the outpatient unit of a tertiary level health facility in Ruvuma, Tanzania.

METHOD

This cross-sectional study was conducted from September to October 2017 at Songea Regional Referral Hospital. A total of 802 patients who met the inclusion criteria were recruited from those attending the outpatient department. Inclusion criteria were: age 18-64 years, resident in the study area and consent to participate. Data on socio-demographic characteristics and risk factors for hypertension were collected by questionnaire.

All patients underwent physical examination. Body weight, height, hip and waist circumferences were measured, and the mean of two blood pressure (BP) records were obtained. The participant was regarded hypertensive if the systolic BP was >140 mmHg or diastolic BP was >90 mmHg or had reported regular use of antihypertensive drugs. All patients were classified as normotensive (systolic blood pressure (SBP) ≤120mmHg and diastolic blood pressure (DBP)<80mmHg), pre-hypertensive (SBP 120–139 and DBP 80–89mmHg), hypertension stage 1 (SBP 140–159 mmHg and DBP 90–99mmHg) or hypertension stage 2 (SBP≥160mmHg and DBP ≥100mmHg).[3]

The body-mass index (BMI) was calculated and patients classified as underweight (< 18.5 kg/m2), normal weight (≥18.5-24.9 kg/m2), overweight (≥25-29.9 kg/m2) or obese (≥ 30 kg/m2).

Recommended salt intake per day was defined as 6g or less while excessive salt intake was defined as> 6g (about one-teaspoonful) a day. For physical activity, patients were grouped: (1) vigorous physical activity, (2) moderate physical activity, (3) insufficient physical activity to meet vigorous or moderate levels, and (4) no physical activity.

Waist and hip circumferences were measured using flexible tape measure just above the iliac crest and at the maximum circumference of the hip, respectively. Waist-to-hip ratios of>1.0 for males and >0.85 for females were considered as abdominal obesity.

The study protocol was approved by the Internal Ethical Committee of Archbishop James University College. Permission to conduct the study was obtained from local and hospital authorities. Individual informed consent was obtained from patients

Statistical analyses were done using Statistical Package for Social Sciences version 24.0 (SPSS Inc., Chicago, IL, USA). Continuous data were expressed as means ± standard deviation (SD) and categorical data as percentages. Two-tailed Fisher's exact tests were used to assess the associations between different variables. Logistic regression analyses were done to assess predictors of hypertension. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 802 patients were enrolled: 48.3% were

Table 1. Socio-demographic, behavioural and clinical characteristics

Characteristics	n (%)
Sex	
Males	415(51.7)
Females	387(48.3)
Age (years)	
18 – 34	102(12.7)
35 – 44	161(20.1)
45 – 54	127(15.8)
55 – 64	234(29.2)
65+	178(22.2)
Mean ± SD	52.4±13.8
Marital status	
Married	388(48.4)
Cohabiting	68(8.5)
Single	132(16.5)
Widowed	172(21.4)
Divorced	42(5.2)
Residence	
Urban and semi-urban	491(61.2)
Rural	311(38.8)
Education level	
Informal	50(6.2)
Primary	500(62.3)
Secondary	221(27.6)
Tertiary	31(3.9)
Occupation	
Peasant	423(52.7)
Employed	214(26.7)
Business person	113(14.1)
Others	52(6.5)
Waist-to-hip ratio	
Men	
≤ 0.95	94(22.7)
0.96 – 0.99	259(62.4)
≥1.00	62(14.9)
Women	
≤ 0.80	211(54.5)
0.81 – 0.85	119(30.8)
≥ 0.86	57(14.7)

SD = Standard deviation

Body-mass index (kg/m2)	
< 18.5	155(19.3)
18.5 – 24.9	528(65.9)
25 – 29.9	81(10.1)
≥ 30	38(4.7)
Mean ± SD	19.5±3.8
Smoking status	
Current smokers	52(6.5)
Past smokers	69(8.6)
Non-smokers	681(84.9)
Alcohol consumption	
Current consumer	143(17.8)
Past consumer	274(34.2)
Never consumed	385(48.0)
Physical activity	
Vigorous	433(54.0)
Moderate	225(28.1)
Insufficient	127(15.8)
No activity	17(2.1)
Fruits consumption per week	
1 – 3 days	429(53.5)
≥4 days	294(36.6)
Not at all	79(9.9)
Salt consumption	
Recommended or less	608(75.8)
Excessive	194(24.2)
Consumption of vegetables per week	
1 – 3 days	158(19.7)
≥ 4 days	639(79.7)
Not at all	5(0.6)
Family history of hypertension	117(14.6)
Use of oral contraceptives (females)	36(4.5)
History of diabetes mellitus	63(7.9)
History of hypercholesterolemia	22(2.7)
Suffered from renal failure	9(1.1)
Suffered from heart failure	56(7.0)
Suffered from stroke	8(1.0)

females; 87% were aged above 35 years; the mean age was 52.4±13.8 years; 48.4% were married. Almost half (48.0%) had never consumed alcohol while 84.9% denied a history of smoking (Table 1).

A quarter (24.2%) reported excessive consumption of salt and 90.1% consumed fruits at least 1 - 3 days a week; 99.4% ate vegetables at least 1-3 times a week (Table 1). Above normal waist-to-hip ratios were found in 14.9% of males and 14.7% of females. The mean BMI was 19.5±3.8 kg/m2; 4.7% were classified as obese; 17.9% were classified as taking insufficient or no physical exercise (Table 1).

Of the 802 patients, 164 (20.4%) were hypertensive: 132(16.4%) and 32(4.0%) in stages 1 and 2 respectively (Table 2).

Among females, 21.4% were hypertensive compared to 19.5% of men (p=0.54). Hypertension was also associated with alcohol consumption, insufficient or no physical activity, and history of hypercholesterolemia (Table 3).

High BMI, smoking tobacco or using tobacco products, and coexisting history of diabetes mellitus were predictors of hypertension. Non-modifiable factors such as age and sex, and modifiable behaviours such as excessive alcohol and/or salt consumption and lack of adequate physical activity were not predictors of hypertension (Table 4).

DISCUSSION

The proportion of hypertensive patients attending the outpatient department was 20.4%. This is lower than that reported in hospital-based studies in Ethiopia[10] and South Angola[11] but twice that in another Ethiopian study.[12] The result is slightly lower than in community-based studies within Tanzania[6,7] but slightly higher than in North West Tanzania[13] and southern Ethiopia.[14] The differences may reflect variations in the occurrence of medical conditions associated with hypertension and also variations in the numbers of urban and rural patients in the studies.[10, 11]

We observed a prevalence (36.9%) of pre-hypertension similar to an observation in North West Tanzania where the overall prevalence rate (8.0%) of hypertension was lower.[13] Our findings show the public health burden facing both rural and urban Tanzania.

We observed an increase in the prevalence of hypertension asso¬ciated with age consistent with findings worldwide. [3,4,6,15] Several African studies have explored the association between gender and hypertension with varying findings. [14] We found the prevalence of hypertension was similar among males and females at 19.5% and 21.4% respectively agreeing with other reports.[10] The association with marital status was intriguing and needs further study to determine if this is a true association.

Table 2. Distribution of patients according to blood pressure categories

Variable	n	Normo-tensive (%)	Pre-hypertension (%)	Hypertension stage 1 (%)	Hypertension stage 2 (%)	Total hypertensive (%)
General population	802	42.7	36.9	16.4	4.0	20.4
SBP ± SD	802	119.4±7.2	131.6±5.8	147.4±6.3	161.2±3.2	150.5±4.0
DBP ± SD	802	76.2±5.9	83.1±3.5	93.5±1.7	101.5±2.6	94.6±1.5
Sex						
Male	415	43.3	37.2	14.3	5.2	19.5
Female	387	38.5	41.1	15.8	5.6	21.4
Age (years)						
18 – 44	263	47.7	37.5	10.6	4.2	14.8
45+	539	40.6	36.2	16.9	6.3	23.2

SBP =Systolic blood pressure; DBP= Diastolic blood pressure; SD= Standard deviation

Table 3. Prevalence of hypertension across socio-demographic, behavioural and clinical characteristics

Characteristics	n	Hypertension, n (%)		OR (95% CI)	p-value
		Normotensive	Hypertensive		
Sex					
Male	415	334(80.5)	81(19.5)	0.89(0.63 − 1.25)	0.54
Female	387	304(79.6)	83(21.4)		
Age (years)					
18 – 44	263	224(85.2)	39(14.8)	0.58(0.39 − 0.86)	0.01
45+	539	414(76.8)	125(23.2)		
Marital status					
Married	388	294(75.8)	94(24.2)	1.57(1.11 − 2.22)	0.01
Not married	414	344(83.1)	70(16.9)		
Education level					
≤Primary level	550	468(85.1)	82(14.9)	0.36(0.26 − 0.52)	<0.0001
> Primary level	252	170(67.5)	82(32.5)		
Occupation					
Self-employed*	588	490(83.3)	98(16.7)	0.45(0.31 − 0.64)	<0.0001
Civil servants	214	148(69.2)	66(30.8)		
Waist-to-hip ratio					
Men					
≤ 0.99	353	325(92.1)	28(7.9)	0.01(0.01 − 0.03)	<0.0001
≥1.00	62	9(14.5)	53(85.5)		
Women					
≤ 0.85	330	296(89.7)	34(10.3)	0.02(0.01 − 0.04)	<0.0001
≥ 0.86	57	8(14.0)	49(86.0)		

Body-mass index (kg/m2)					
≤ 24.9	683	544(79.6)	139(20.4)	0.96(0.60 – 1.55)	0.90
≥ 25	119	94(79.0)	25(21.0)		
Ever or still smoking					
Yes	121	100(82.4)	21(17.6)	0.79(0.48 – 1.31)	0.39
No	681	538(79.0)	143(21.0)		
Ever or still consuming alcohol					
Yes	417	345(82.7)	72(17.3)	0.66(0.47 – 0.94)	0.02
No	385	293(76.1)	92(23.9)		
Physical activity					
Vigorous or moderate	658	547(83.1)	111(16.9)	0.35(0.23 – 0.52)	<0.0001
Insufficient or no activity	144	91(63.2)	53(36.8)		
Fruits consumption per week					
At least 1-3 days	723	574(79.4)	149(20.6)	1.11(0.61 – 1.99)	0.77
None	79	64(81.0)	15(19.0)		
Salt consumption					
Excessive	194	136(70.1)	58(29.9)	2.02(1.39 – 2.93)	<0.001
Normal or minimal	608	502(82.6)	106(17.4)		
Family history of hypertension					
Yes	117	95(81.2)	22(18.8)	0.89(0.54 – 1.46)	0.71
No	685	543(79.3)	142(20.7)		
Use of oral contraceptives (females)					
Yes	36	29(80.6)	7(19.4)	0.94(0.40 – 2.18)	1.00
No	766	609(79.5)	157(20.5)		
History of diabetes mellitus					
Yes	63	53(84.1)	10(15.9)	0.72(0.36 – 1.44)	0.42
No	739	585(79.2)	154(20.8)		
History of hypercholesterolaemia					
Yes	22	6(27.3)	16(72.7)	11.39(4.38 – 29.60)	<0.0001
No	780	632(81.0)	148(19.0)		
History of renal failure					
Yes	9	66.7)6)	33.3)3)	1.96(0.49 – 7.93)	0.40
No	793	79.7)632)	20.3)161)		
History of heart failure					
Yes	56	78.6)44)	21.4)12)	1.07(0.55 – 2.07)	0.86
No	746	79.6)594)	20.4)152)		

Note: Self-employed included businesspersons, peasants and others; civil servants included employees in both public and private sectors.

OR = Odds Ratio; CI= Confidence Interval; SD= Standard deviation

Table 4. Logistic regression analysis of the selected risk factors for hypertension

Variable	AOR (95% CI)	p-value
Sex	0.94(0.31 – 2.81)	0.91
Age (years)	0.64(0.18 – 2.21)	0.47
Marital status	1.46(0.48 – 4.39)	0.50
Education level	0.36(0.12 – 1.12)	0.08
Occupation	0.51(0.16 – 1.64)	0.27
Body-mass index	2.73(0.89 – 11.01)	0.04
Smoking	3.70(0.99 – 13.81)	0.03
Alcohol consumption	0.64(0.21 – 1.94)	0.43
Physical activity	0.46(0.13 – 1.58)	0.23
Salt consumption	1.62(0.48 – 5.45)	0.44
Family history of hypertension	2.78(0.78 – 9.89)	0.13
History of diabetes mellitus	5.36(1.33 – 21.68)	0.02

AOR = Adjusted Odds Ratio; CI = Confidence Interval.

In this study, almost 15.0% of both male and female patients had higher than normal waist-to-hip-ratio: of these, 85.5% of males and 86.0% of females had high blood pressure. Furthermore, being overweight or obese was significantly associated with three times increased risk of hypertension), and this is consistent with findings reported in community-based studies in sub-Saharan Africa.[6,7,10]

It is a well-established that obesity is associated with accumulation of "bad" cholesterol in the blood vessels reducing the blood flow with consequent hypertension. Interplay of factors that include sodium retention and activation of the renin-angiotensin – aldosterone system tends to occur in obesity and additionally vessel wall inflammation and insulin resistance may promote changes in the vascular function resulting into hypertension.

In this study, a history of hypercholesterolemia was significantly associated with the occurrence of hypertension. Patients who gave a history of diabetes mellitus had a five times risk of developing hypertension. Similarly, having a history of smoking was associated with a four times increased risk of hypertension. On the contrary, alcohol consumption and family history of hypertension did not have significant risk of having hypertension. This surprising discrepancy might be due to the low frequency of individuals with these risk factors in the study population. Also, the judgment as to alcohol consumption by an individual is notoriously difficult.

This being a cross-sectional study precludes the determination of any causal-effect relationships between variables. Another limitation is that our data were obtained from a single centre and may not represent the general population of southern Tanzania. The fact that blood pressure measurements were taken on a single day is a further limitation. Also, importantly, the study assessed only demographic, behavioural and physical measurements; due to resources limitations, we did not do biochemical investigations which may have added further useful data.

CONCLUSION

In this study, almost one-fifth of the study population was hypertensive and another one-third were pre-hypertensive indicating a serious silent public health problem. Being overweight or obese, smoking tobacco, and a history of diabetes mellitus were predictors of hypertension. We recommend the promotion of health education about healthier life styles focusing on modifiable risk factors for hypertension.

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