Original Article

Hypertension and Determinants Factors among Sudanese Population

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Abstract

Introduction: Hypertension is common health problem contributes to cardiovascular diseases.

Study aim: Aim of the study toassess determinants factors among hypertensive Sudanese rural population.

Methods: Descriptive cross-sectional study, conducted at rural Sudan, Sinnar State. Participants at age of 25-64 year. A cluster sampling technique was used to collect data,and the total sample size was 341 participants. Collected data was cleaned, edited and analyzed using (SPSS) version 16.0.

Results: Study found hypertension was 21.10%, systolic 5.9%, diastolic 10.0%. and highly significant among age group of 55-64year. Determents factors were varied and high among hypertensive population and significantly associated with hypertension diabetes mellitus18.1%,Cushing syndrome2.8%, steroid therapy5.6%, and participants were has higher probability to develop hypertension approximately 5 times than those without such problems. Also subjects with chronic kidney disease8.3%, hypothyroidism5.6%, and sleep apnea 6.9%, has four times chance to develop hypertension, but these factors insignificant associated with hypertension as indicated by (OR and P-value<0.005).

Conclusion: Hypertension was 21.10%, and highly significant among age group of 55-64year.Most of hypertension determinantsfound by the studywere positive history of hypertension, diabetes mellitus, renal disease, emotional stress, and sleep apnea. Thus, thefindings confirmed growing concern about hypertension as a public health problem in rural Sudan.

Keywords: Determinants Factors, Hypertension, Population,Rural,Sudan

Introduction

Hypertension is a global public health issue which contributes significantly to cardiovascular disease, kidney failure, premature deaths and disabilities[1].Is defined as a systolic blood pressure (SBP) of ≥ 140 mm/Hg, a diastolic blood pressure (DBP) of ≥ 90 mm/hg, or taking antihypertensive medications[2]. World Health Statistic 2012, reported hypertension causes 51% of stroke deaths and 45% of coronary heart disease deaths[3]. About 31% of the adults in the United States have hypertension[4]. Recent evidence showed that between 1990 and 2015, there has been an increase in hypertension incidence, prevalence and deaths globally[1].By the year 2025, were predicted thatmortality rate related to hypertension accounted to 20%–50% overall deaths and the adults predicted to develop hypertension is 1.56 billion. The highest prevalence of hypertension reported was in Africa and approximately 80% of deaths in low-middle income countries were due to cardiovascular disease which is commonest complication of hypertension[5].

Prevalence of hypertension increases with advancing age documented by literature. But nowadays, the age criteria have been changed and even people below 30 years of age have hypertension complicationsrelated to lack of exercise, fast foods, smoking, coffee and alcohol consumption and the genetic effect may also be a factor[6.] Also, notice during the last few decades, lifestyle of people in towns has undergone major changes due to rapid urbanization, changed of eating habits of people as refined carbohydrates, fast foods and saturated fats while smoking rates have increased. These factors combined together to increase the rates of non-communicable diseases and cardiovascular risk factors[7]. Overall, prevalence of hypertension were high in different region. For instance, the prevalence of hypertension in urban population in north of Sudan was estimated more than 30%. While in rural population was estimated between 15% - 38%[8].

A literature search on prevalence and determinants of hypertension in Sudan revealed fewer available recent publications on this problem[9].The study aim toidentifydeterminants factors that contributes to hypertension in Sudan rural community.

Study Methods

Study design

Quantitativecross-sectional descriptive study design.

Study area and population

The study was conducted in Alsakania town; a rural arealocated north-east of Sinnar city. It is accommodation families of workers and employees of west Sinnar Sugar Factory, and the population was composed of different ethnic groups with diversity of socio-cultural contexts and believes, and were affected by process of urbanization.A total number of population as estimated last censusin year 2009 is 2170 inhabitants, residence in 390 households.

Inclusion Criteria

The studyincluded both genders; male and female resident permanently in the study area, their ages ranged between 25 - 64years, and both hypertensive and normotensive.

Exclusion Criteria:

The study was excluded resident population below 25 years of age and above 64years**,** children, pregnant ladies**,** visitors and guests temporally resident in the study area.

Sample Size and sampling technique

The sample size was estimated using the following standard formula[10]

$n = N/ 1+N (D^2)$

The technique used for drawing the sample was cluster sampling technique[11], and the total sample size was 341 subjects.

Methods of data collection

Data collection tools

Data was collected using a standardized administered questionnaireand observation checklist.Questionnaire was included closed-end questionsabout personal data; gender, age, educational level, marital status, and total monthly income of the respondents, and details questions about hypertension determinants, and checklistforobserving and recording the blood pressure, height, and weightmeasurements of participants'. Questionnaire was pre-test and some modifications and adjustments were done to ensure validity and accuracy. Datawas collected by senior nurses, and were subjected to train on administrating the questionnaire, and skills onblood pressure, height and weight measurements, andhow to conduct interview.

Measurements procedures

Blood pressure was measured according to recommendations of Seven Reports of Joint National Committee (JNC) on Prevention,

Detection, Evaluation and Treatment of high blood pressure. The subject was seated quietly on a chair for at least 5 minutes and refined from caffeine, exercise, and smoking for at least 30 minutes prior to measurement. Suitable cuff sized was used. Both systolic (SBP) and diastolic (DBP) were recorded, two measurements were made and the average of blood pressure was calculated. Subjects were labeled as hypertensive if the blood pressure was equal to or more than 140/90 or were taking antihypertensive medications[2].

Weight was measured using (Nikai Japan Ltd, Shinohora) electronic scale with a properly calibrate[12]. Scale was sated at zero reading, the subject was asked to remove shoes, heavy outer clothing, and stand on the scale with both feet together, and weight value recorded to the nearest 0.1 (1/10) kilogram[13]. Height was measured using (JM.JIEMEL, $5m^{x16FT}$, Jm-8006 measure tape). Subjects were asked to remove shoes, hair ornaments,stand with their back to the height rule, feet together, look straightand with the head in Frankfort plane[14].The tape was installed vertically flat place the measurement base on the ground, stretch the metal band until its scale indicated the marked position on a wall to record the height[12].Overweight and obesity were assessed by using body mass index (BMI) based on Centers for diseases Control and Prevention categories, and defined using formula (weight in Kg/ height in metres²**)**[15].

Ethical considerations

An ethical approval was obtained from the Institutional Review Board at Al-Neelain University andAlsakania town Popular Committee. An informed written consent was obtained from each participant before interviewed.

Data analysis and presentation

Data was analyzed using Statistical Package for Social Science (SPSS) version 16.0 after pre- coded and pre-tested. Descriptive statistic was done to describe a single variable such as socio-demographic factors. Data was created in a frequency distribution and percentage, which was presented in a table format. Prevalence of hypertension was calculated as the percentage of participants classified as hypertensive, with all study participants as the denominator[11].Arithmetic mean and standard deviation (SD) were calculated for numerical data such as the age and monthly income, and the t test for independent samples was used to compare the mean systolic and diastolic blood pressure among hypertensive subjects in regarding to gender. Association between hypertension and the effect of exposure variableswere studied using Odd ratios (OR) with 95% confidence interval (CI) and the chi-square test were used to compare categorical variables and a $p < 0.005$ to cut-off level for statistical significance.

Results

Table (1): Demographic characteristics of the study population(n=341)

Characteristics		Frequency	Percentage
Gender	Male	164	48.0
	Female	177	52.0
Age in years	25-34years	80	23.5
	35-44years	80	23.5
	45-54years	122	35.7
	55-64years	59	17.3
Educational level	Illiterate	22	6.5
	Primary school	76	22.3
	Secondary school	150	44.0
	University/above	93	27.2
Marital status	Married	298	87.3
	Single	32	9.4
	Widow	7	2.1
	Divorced	4	1.2
Monthly income	No income	153	44.8
	Low income	17	5.0
	Moderate income	122	35.8
	High income	49	14.4

*Mean age: 43.67 ± (SD10.508 years)*Median monthly income: 700.00/SDG

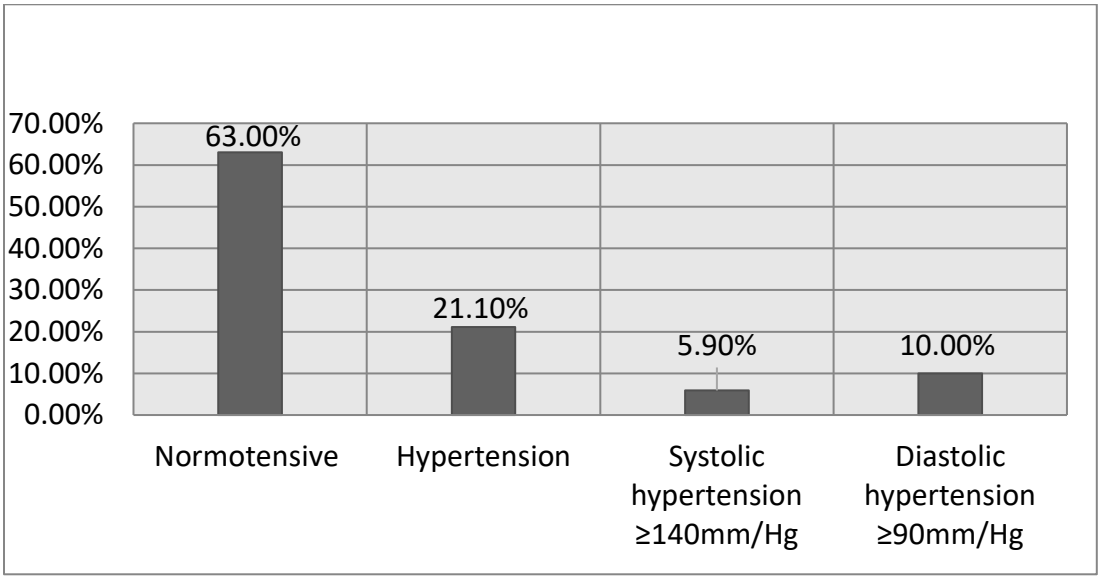

Figure (I): Hypertension status among study population(n=341)

Table (2): Hypertension, systolic and diastolic in relation to gender and age groups among study population(n=341)

Hypertension		Gender			P-value
		Hypertension both systolic and diastolic	Systolic hypertension ≥140mm/Hg	Diastolic hypertension ≥90mm/Hg	
Gender	Male	21.3%	3.7%	9.8%	0.409
	Female	20.9%	7.9%	10.2%	
	Total	21.1%	5.9%	10.0%	
Age groups	25-34year	11.2%	3.8%	11.2%	0.003
	35-44year	16.2%	2.5%	11.2%	
	45-54year	32%	5.7%	7.4%	
	55-64year	18.6%	13.6%	11.9%	
	Total	21.1%	5.9%	10.0%	

Table (3): Mean systolic and diastolic blood pressure among hypertensive population in relation to gender

Hypertension		N	Mean	Std. Deviation	Std. Error	F	P-value
Systolic blood pressure in mm/Hg	Male	35	141.71	9.231	1.560	0.020	0.889
	Female	37	142.03	9.388	1.543		
Diastolic blood pressure in mm/Hg	Male	35	91.29	8.344	1.410	1.383	0.244
	Female	37	90.81	8.038	1.321		

Table (4): Factorscontributestohypertension among hypertensive subjects (n=72)

Factors	Factor contribution	Odd. Ratio	95% Confident Interval	P-value
Positive history of hypertension	29.2%	2.454	1.631-3.691	0.000
Positive history of DM	25.0%	2.085	1.349-3.223	0.002
Positive history of Renal disease	16.7%	2.073	1.265-3.397	0.008
Sleep apnea	6.9%	3.561	2.127-5.960	.001
Diabetes mellitus	18.1%	4.199	2.958-5.962	0.000
Chronic kidney disease	8.3%	3.784	2.402-5.962	0.000
Hypothyroidism	5.6%	3.953	2.429-6.433	0.001
Cushing Syndrome	2.8%	4.843	3.931-5.967	0.006
Steroid therapy	5.6%	4.956	4.008-6.128	0.000

Over weight	48.6%	-	-	0.051
Obese	15.3%			
Low salt diet	22.2%	0.821	.498-1.354	.434
High Salt diet	77.8%			
High cholesterol diet	95.8%	0.253	.083-.773	.005
Low cholesterol diet	4.2%			
Physically an inactive	86.1%	0.535	.288-.993	.036
Physically active	13.9%			
Active smoking	20.8%	1.824	1.139-2.919	.018
Passive smoking	29.2%	1.486	.959-2.303	.084
Stress	56.9%	1.362	.899-2.063	.142

*Odd ratios (OR) with 95% confidence interval (CI), $p < 0.005$ for significance

Discussion

Hypertension is more common and serious condition that can lead to or complicate many health problems. The risk of cardiovascular morbidity and mortality is directly correlated with blood pressure.[16].

The study comprised52.0% women and 48.0% men, overall mean age 43.67 ± (SD10.508 years), ranged between 25 and 64 years, and about35.7% of participants in age group between 45-54 years and their income showed marked variations and the median value was 700.00/SDG.Hypertension diagnosed in 72 out of 341 individuals investigated. Thus over all prevalence rate was 21.10%. According to JNC7 guidelines, a person is defined as having hypertension if the systolic and diastolic blood pressure is equal to or greater than 140/90 mm/Hg.Nonetheless, the study documented higher prevalence than found by study conducted among Sudan rural population in four states, 2012reported 15.8% hypertension prevalence rate[5]. And lowers than documented by Khalil SI, et al. 2015, among rural Sudan communities, yielded 35.7% prevalence rate[7],andlower than reported by previous study in rural Uganda 30.4%[17].Nevertheless, was a higher than found among Iranian population 17.3%[18].Furthermore, when it was compared with the prevalence in urbanSudan, wasfound to be more than reported by study in Juba South Sudan 2012 (19.3%)[9],Balla SA, et al. 2014[5], and greater than that investigated by two studieswereconducted d in 2018among urban population in Khartoum state which documented27.6%[8],and other inNorth Sudan reported35.7% hypertension prevelence[19].Thus hypertension was increasing and appearing to be lower in rural than an urban areas, as was supported by National Ministry of Health Directorate General of Public health and Emergency reporton hypertension prevalence in Sudan[20].

Prevalence of systolic and diastolic hypertensionwere 5.90% and 10.00% respectively, and an insignificant a higher among women(p-value=0.409). This is lower than that estimated by study done in Indian rural community among age group of 30 years and above which documented prevalence of (18.5 -15%) systolic and diastolic respectively [21]. Also, the study found significant high blood pressure 32.0% among age group of 45-54 years(P-value=0.003) Table: (2). Hypertensive subjects have similarly mean for both systolic and diastolic blood pressure among gender population (p-value<.005) Table: (3). This result was agree with that documented by study done among adults

in Addis Ababa 2009[22], and disagree with other study among Ghanaian population,2014[1].

Regard determents factors of hypertension(Table: (4), the study found that, hypertension was significantly associated with diabetes mellitus, Cushing syndrome, and steroid therapy, and participants therefore has higher probability to develop hypertension approximately 5 times than those without such these problems. Also subjects with chronic kidney disease, hypothyroidism, and sleep apnea were had four times chance to develop hypertension(P-value<0.005). While high blood pressure 95.8%,77.8%, and 86.1%, respectively were found among participants taken high cholesterol, high salt diet and physically an inactive, but these factors were an insignificant contributes to hypertension(P-value > 0.005).This finding disagree with that reported by (Awadalla H, et al. 2018)[8].In addition to that, the study found hypertension was an insignificant associated with stress56.9%,CI (0.899-2.063). Stress leads to an increase catecholamine levels and this associated with the presence of essential high blood pressure[4].

There isextensive epidemiological evidence supports a positive association between body weight and elevated blood pressure[23].The study yielded, insignificanthypertension among overweight and obese with proportions of 48.6% and 15.3% respectively (P-value = 0.051). But the finding was higherthan documented by study in western Turkey a semi-rural area[24]. Finally smoking does not directly cause high blood pressure but it has a higher risk of heart attack and stroke cited by litrature[4], the study found hypertension among smokers was high and mainly presented among male and therefore is considered as contributor factor, and active cigarettes smoked was 20.8%, but has 1.8 time and greater risk on hypertensionversus passive smoked. The findings therefore, were provided important information about the hypertension and its determinants factors, and confirm that hypertension as disease burden that required concentrated prevention and control efforts[25].

Conclusion

The study was concluded that, hypertension was21.1%, systolic 5.9%, diastolic 10.0%. Hypertension was highly significant and positively associated and co- existed among hypertensive population such positive history of hypertension, positive history of diabetes mellitus, and diabetes mellitus, chronic kidney disease, sleep apnea, and hypothyroidism, as indicated by(OR and P value <0.005).Although, there were insignificant factors found to be associated with hypertension;stress, inactivity, overweight and obesity, high salt diet, high cholesterol diet, and smoking. The subjects probability to develop hypertension were twice times more than those with negative history of such risk factors.

Recommendations

The study recommended that, improve population awareness about hypertension, early detection and treatment of high blood pressure may reduce the risk of complications. Importance of changing life habits of individuals by means of educational programs that provide necessary information to encourage life style modification and adopting the DASH eating plan were highly recommended. In addition to strength responsibility of health care providers to motivate population regard healthy life style practices that can help to prevent and control hypertension.

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