



Research Article

HYPERTENSION AMONG WOMEN IN TIRAIRA MADANI, RURAL SUDAN: PREVALENCE AND RISK FACTORS, 2014

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ABSTRACT

Background

Hypertension is a major risk factor for strokes, cardiovascular and kidney diseases worldwide and it has considerable variation in its prevalence across different geographic locations and ethnic groups.

Objectives

This study aimed to estimate the prevalence of hypertension and to determine its major risk factors among women.

Methods

A Descriptive cross-sectional community based study was conducted in Tirira Madani village –Sennar state- Sudan. A total of 255 women aged (15 – 75) years were interviewed using a structured questionnaire. Blood pressure was measured twice. Hypertension was taken as blood pressure ≥ 140 mmHg and/or ≥ 90 mmHg for systole and diastole respectively. Descriptive cross-tabulations and bivariate analyses were used. The statistical significance was tested using chi-square test. Predictor factors to hypertension were tested by logistic regression.

Results

Prevalence of hypertension among participants was 25.9%. Factors found to be associated with hypertension were; age, illiteracy, low salt intake, family history of hypertension, Coffee intake of more than two cups daily, fish consumption, low physical activity, and high socio-economic status. Certain ethnic groups were at increased risk compared to others (RR=2.11, 95%CI: 1.265 – 4.588). Logistic regression model showed age, ethnicity, physical activity level, education level and family history were predictors of hypertension (*P-value* <0.05).

Conclusion

Hypertension was prevalent in rural Sudan. Age, ethnicity, socio-economic status, level of education and family history of hypertension were the major risk factors of hypertension.

INTRODUCTION

Hypertension or high blood pressure (BP) is the most common risk factor for cardiovascular disease (CVD) and stroke, affecting 20% of the adult population both in the developed and developing worlds. Identification and analysis of risk factors associated with CVD such as hypertension and hyperlipidaemia is one approach to the eventual control of CVD [1]

Globally, 51% of stroke and 45% of ischemic heart disease (IHD) deaths are attributable to high systolic blood pressure [2]. 10-20 million people in sub-Saharan Africa may have hypertension and that treatment could prevent around 250000 deaths each year [3]. Regional differences in the prevalence of hypertension within countries have been identified [1]. In Sudan hypertension had a prevalence of 20.1 % [4]. Un-diagnosed hypertension is detected in 38.2% of population in two towns in Northern Sudan [5]. In rural population in Sudan the hypertension prevalence is 23.3% 19.9%, 17.3% in central, northern, and eastern Sudan respectively [6]

The number of adults with hypertension in 2025 has predicted to increase by about 60% to a total of 1.56 billion (1.54–1.58 billion), that means Hypertension is an important public-health challenge worldwide [7]. Hypertension is asymptomatic and is usually diagnosed incidentally or after major organ damage has occurred [8]. In Sudan, hypertension is increasing in prevalence, but the presence of many undiagnosed cases masks the real prevalence of the disease. Therefore, effective screening is essential to reduce subsequent complications [5]. This study aimed to estimate the prevalence of hypertension and to determine its major risk factors among women.

MATERIALS AND METHODS

Study design

This is descriptive cross-sectional, community based study, was conducted in Tirira Madani village, which located in Al Suki locality- Sennar state, Sudan. The Sennar state lies on the rich Savannah belt and its one of the 18 states of Sudan. Sudan is located in the northeastern part of Africa between the 22.4 latitude northern equator and 38.22 longitudes. Population of Sudan in the beginning of the year 2011 is estimated to be about (33.419.625) persons at a growth rate of 2, 53 annually, it consists of 18 states [9] Population of Tirira Madani in the last census (2011) is estimated to be about (7857) persons, 5500 were women.

Study population

The Study population was women of Tirira village, between (15 -75) years of age, with or without previous diagnosis of hypertension.

Sample size

By using Epi-Info a computer program the estimated sample size was 255 individuals the population size was 5500.

Sampling technique

A cluster sampling technique was used, the village population had been divided into six clusters based on the major residential neighborhoods, and then five clusters out of six had been selected randomly. The first house of the residential neighborhood had been selected randomly, and then every woman in the following houses was asked to participate in the study until 51 women from each cluster had been selected.

Data collection

Data was collected by using a questionnaire administered by an interviewer, the questionnaire was in a form of Closed-response questions. It contains the variables of population characteristics, previous diagnosis of hypertension, salt intake, coffee intake, fish consumption, socioeconomic status, physical activity, and family history of hypertension. Blood pressure was measured by using mercury sphygmomanometer (adult size) and stethoscope twice with five minute interval between each measurement and the average value of the two measurements has been used. The measurement was repeated in the next day for women whose blood pressure was ≥ 140 mmHg for SBP and/or ≥ 90 mmHg for DBP for the first time (not previously diagnosed as hypertensive), and the average value of the four measurements has been used.

Diagnosis of hypertension

The blood pressure was diagnosed according to American Society of Hypertension and the International Society of Hypertension Guidelines (ASH-ISH Guidelines 2013) [42]. If systolic blood pressure and diastolic blood pressure fall into different categories, the higher value had been taken for classification.

Data analysis

Data had been analyzed by using SPSS version 20. Cross-tabulations were used to describe the distribution of hypertension among the different categories of the independent variables. For testing the statistical significance chi-square test was used to show whether or not there is a statistically significant relationship between the categorical variables. A P value < 0.05 was considered statistically significant.

Bivariate analyses were conducted by means of risk estimation statistic to measure the association between each independent variable and the dependent variables and

the analysis was expressed in a form of odd ratio with corresponding 95% CIs.

To determine the impact of the multiple independent variables presented simultaneously to predict hypertension, a binary logistic regression analysis was conducted using age, coffee intake, fish consumption, salt intake, ethnicity, socioeconomic status, physical activity level, educational level and family history of HTN as predictors and hypertension (presence or absence) as the dependent variable. Again the analysis was expressed in a form of odd ratios with corresponding P values and 95% CIs.

Ethical Considerations

Ethical clearance was obtained from the department of community medicine of Al Neelain University, from Sennar Ministry of Health and verbal consent was obtained from each participant involved in the study after a comprehensive explanation of the purpose and procedure of the study in local languages. For young girls under eighteen years (under age) a verbal consent was obtained from their parents. All personal information and measurements were kept confidential. A written permission was obtained from the village people committee and community leaders.

RESULTS

This is descriptive cross-sectional, community based study conducted in Tirira Madani village and the results revealed that most of women were younger than 46 years of age and most of them did not reach the primary level of education. A large sector of the studied group was farmer and housewife. Married women were found to constitute more than half of the studied sample. The data showed great variation in the ethnicity, with the Rofaa constitutes the largest ethnic group [Table1]. The prevalence of hypertension was 25.9%(95%CI: 20.52% - 31.28%) [Figure I].The odd of hypertension was more in older, illiterate women, who have low salt intake, exercise less and who belong to Hawsa and Rayafa ethnic groups as compared to younger, educated women, who have high and moderate salt intake as well as physical activity, and other ethnic groups respectively [Table 2]. By using logistic regression analysis a test of the full model against a constant only model was statistically significant, indicating that the predictors as a set reliably distinguished between hypertensive and non-hypertensive (chi square = 58.591, $p < .001$ with $df = 9$). The Wald criterion demonstrated that age, ethnicity, physical activity level, education level and family history of hypertension made a significant contribution to prediction ($p < 0.05$).

Table 2 Late stages of hypertension (stage2 and 3) were more among elder women (OR =5.419, 95%confidence interval: 2.160– 14.20)

DISCUSSION

This is descriptive cross-sectional, community based study conducted in Tirira Madani village, Sennar State to study

hypertension and its risk factors. The study found that hypertension prevalence was high among participant (25.9%) and this is higher as compared with 15.8 % in rural population in four states of Sudan [6] and 20.1% and 20.4%in the Sudan Household Survey (SHHS) 2006 and annual health statistical reports of the Sudan Federal Ministry of Health(STEPS) survey, respectively⁷.Its lower than in Uganda (27.2%)[10],West Africa (28.7%) [11], United States(30%) [12] , and India (29.8%) [13] but higher than in Nigeria(22%)[14] . The high prevalence in our study may be attributed at least in part to the low level of education - most of women did not reach the primary level of education provided that the study includes women more than fifteen years of age - , life stress, and lifestyle changes or to the genetic makeup of individuals[5]. However, ethnic variations and genetic factors might play a major role as demonstrated by a similar study [15].

Hypertension was more prevalent among elder women than younger, which is consistent with the global trend[16],[17],[18],[19] The risk of hypertension was two times often in elder women compared to younger one. The effect of age may be through the accumulation of environmental influences and the effects of the programmed senescence in the body systems[18], and this can be explained in part by changes in two major kidney receptors; declining in Dopamine (D1) receptors - which maintain normal blood pressure- and exaggeration of Angiotensin II (AT1) receptors-which play a dominant role in promoting sodium retention and blood pressure elevation[20]. Other study revealed that after age 50 or 60 years, diastolic blood pressure may actually start to decrease, but systolic pressure continues to rise throughout life and it reflects the progressive stiffening of the arterial circulation[21]. Also we found that late stages of hypertension were more prevalent among elder women (P value < 0.001), with elder women had five times risk to have late stages compared to younger.

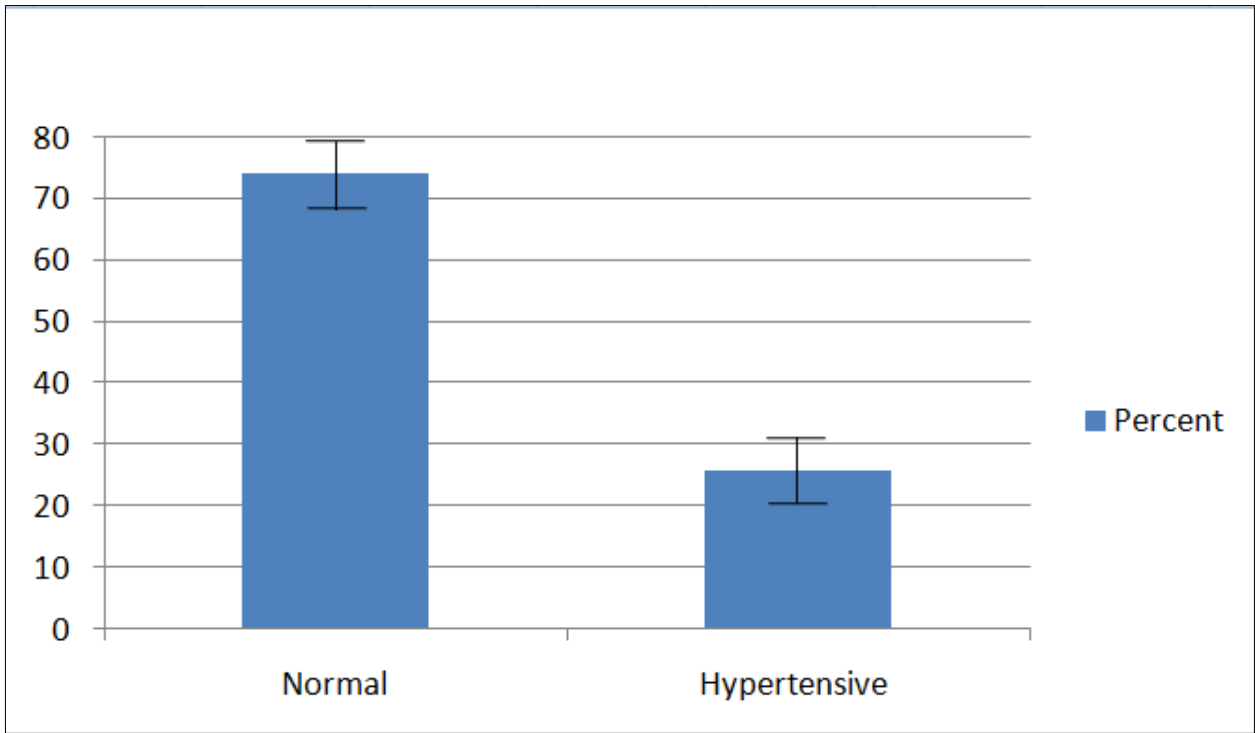
Pre hypertension and hypertension were prevalent in illiterate women and the odd of hypertension was five times often in illiterate women compared to educated one. This finding is consistent with many other previous studies.[22],[23],[24],[25],[26] but it's inconsistent with other study which found that illiteracy is not associated with hypertension[21]. There is no clear explanation for this discrepancy but we can speculate that the community awareness in that area is high so even illiterate subject may have educated and supportive family. Our findings can be attributed to the fact that lower educational levels are associated with obesity [27] unfavorable health behaviors, lower socioeconomic status [24] and lower levels of regular vigorous exercise[17], which are all well known risk factors of hypertension. Furthermore Lower educational attainment has been associated with stressful jobs involving high demands and low job control, which have been associated with hypertension [11].



Table 1: . Background characteristics of the study population

Characteristic	Frequency	Percent
Age		
15-30 years	94	36.9
31-46 years	81	31.8
47-62 years	41	16.1
63-75 years	35	13.7
Level of Education		
Illiterate	81	31.8
Khalwa	31	12.2
Primary	61	23.9
Secondary	52	20.4
Graduate	30	11.8
Occupation		
Retired,unemployed, selfemployed , other	45	17.6
farmer ,housewife	169	66.3
governmental employee ,private sector employee,student	41	16.1
Marital Status		
Single	74	29.0
Marrid	172	67.5
Divorced	2	.8
Widew	7	2.7
Ethnicity		
Rofaa	72	28.2
Rayafa	12	4.7
Hawsa	42	16.5
Gadiat	40	15.7
Gawmaa	44	17.3
Others	45	17.6

Figure 1: Prevalence of Hypertension among the Studied Group (N=255).



(95%CI: 20.52% - 31.28%)

Figure 2: Distribution of systolic and diastolic blood pressure levels among the study participants.

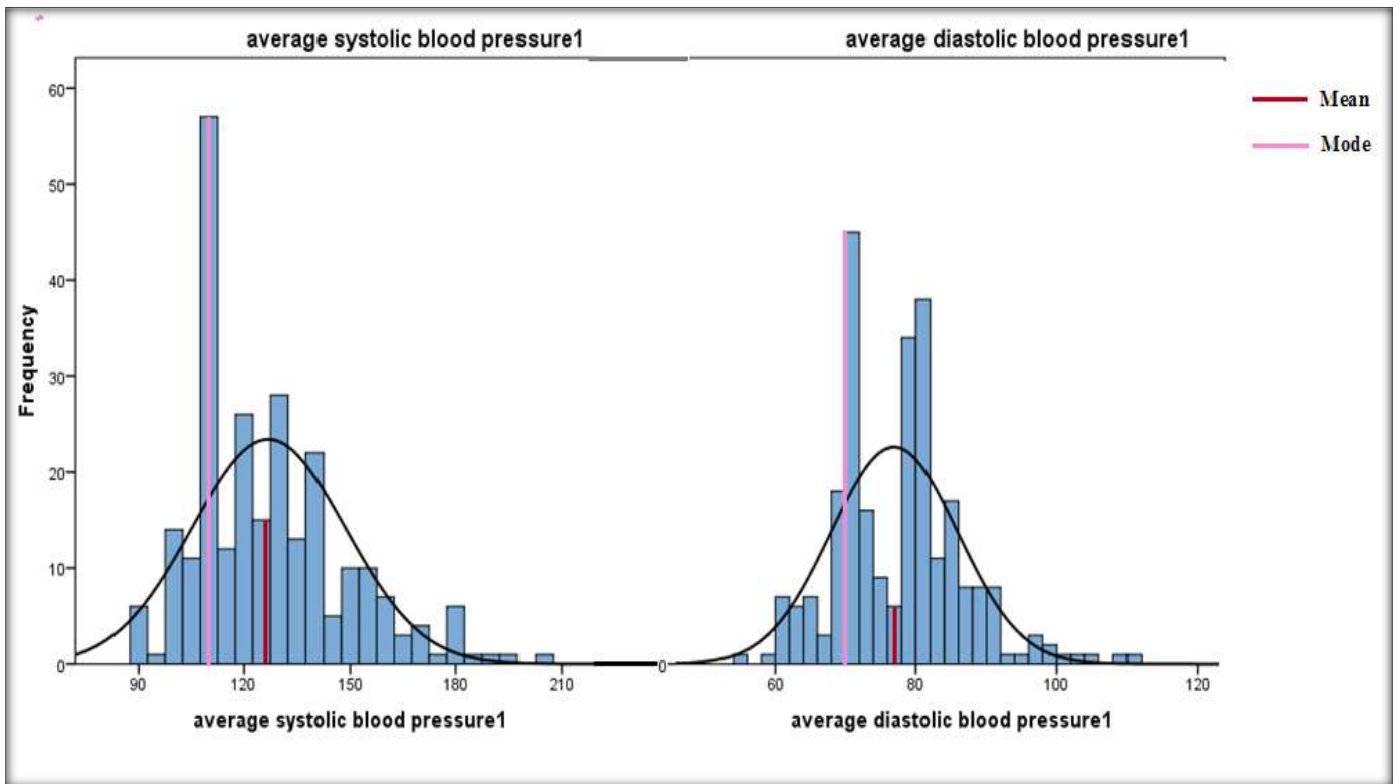


Table 2: The odds ratios (OR) for the association between hypertension and its risk factors.

Factors	Unadjusted OR	Adjusted OR	P value	RR from adjusted OR	95% C.I
Age (≥ 47 years)	5.429	3.452*	0.001	2.111	1.714-7.348
Ethnicity (Hawsa and Rayafa)	2.409	3.452*	0.019	2.111	1.205 - 9.607
Family history of HTN(yes)	1.139	2.067*	0.048	1.619	1.049 -4.422
Socioeconomic status (high and moderate)	3.623	8.642	0.204	2.901	0.655 -3.532
Education level (illiterate)	5.166	3.737*	0.002	2.187	1.412 -7.393
Physical activity level (low)	2.356	2.804*	0.038	1.911	1.058 -6.608
Coffee intake(≥ 2 cups daily)	1.133	1.048	0.863	1.035	0.493-2.194
Lower Fish consumption	.857	0.512	0.255	0.568	0.165 - 1.654
Salt intake(high salt intake)	0.631	0.716	0.329	0.773	0.391- 1.485

* Statistically significant association ($p < 0, 05$)

OR: Odds ratio; CI: Confidence interval.

The study found that hypertension was more in women who take low salt than those who take high salt. Most of the studies have confirmed that high salt intake is one of the main risk factors of hypertension [28],[29]. The odd finding of our study may be due to lowering salt intake after the diagnosis of hypertension.

take more than four cups daily. This finding is comparable to many other studies [30],[31],[32] But it's inconsistent with other studies which show no relation³³ or even an inverse relation[16]. The effect of coffee on blood pressure is attributed to the presence of caffeine which mediates an increase in systemic vascular resistance brought about by its ability to block adenosine receptors[31].

The author in our study found that hypertension as well as pre-hypertension was less in coffee abstainers than who

The authors found that hypertension was prevalent in women with family history of hypertension and mainly the first degree relative. This may be explained, at least in part, by shared environmental influences [19] and inheritance of several possible intermediary phenotypes (genetic traits) that may be related to inherit high BP [34].

In this study, The authors found that having low physical activity puts you at higher risk, while we are not sure that having high physical activity puts you at an advantage compared to moderate; probably due to the small number in that category. Baster T, et al found that inactive individuals have a 30–50% greater risk than their more physically active counterparts for developing high BP as they age [35]. How physical activity positively affects BP is not known. One theory is that physical activity improves endothelial function. There are also vascular structural changes such as increased length, cross sectional area, and/or diameter of existing arteries and veins in addition to new vessel growth [35].

In our study higher socio-economic status (SES) women had 2.9 times the risk of having hypertension as compared to moderate and lower one. This consistent with previous study which revealed that in developing countries high SES is associated with higher mean BPs which may reflect a higher prevalence of obesity, and higher salt and alcohol intakes among those of higher SES [36].

Our data show that hypertension is more in high fish consumer than in less frequent consumer. The finding of NHANES Epidemiologic Follow-up Study (NHEFS) revealed no consistent significant associations of fish consumption with hypertension incidence [37]. In contrast other study revealed that BP parameters were found to be lower in older men and women who were fish consumers in comparison with those who were non-fish consumers [3]. More wise high weekly fish consumption (especially oily fish) may be potentially modifiable independent factors for protecting against risk of hypertension [38]. The differences between the results may be explained at least in part by the difference in the type of fish consumed, methods of preparation and the frequency of fish consumption, moreover most trials used fish oil supplements rather than dietary fish [37], [39]. The meta-analysis of controlled trials revealed that omega-3 fatty acids in fish oil have a dose-response lowering effect on blood pressure [40].

The study found significant association between ethnicity and hypertension. The previous studies revealed that distribution of hypertension is different among different ethnic groups [5], [40]. The odd of hypertension was about two times often in Hawsa and Rayafa ethnic groups compared to other ethnic groups. This difference can be attributed in part to the lower educational level in Rayafa and Hawsa, and coffee intake which is highest in Hawsa and lowest in Gediati. However, genetic factors might play a major role as demonstrated by similar studies [21], [34].

When the independent variables presented simultaneously to predict hypertension in the binary logistic regression model, it revealed that elder women were at a significantly higher risk than younger of being hypertensive. In contrast

lower fish consumer and high salt intake women were at lower risk however that was not statistically significant. Women of Hawsa and Rayafa ethnic groups were more likely to experience hypertension than others. When the odd ratios of the variables in the model was compared to the crude odd ratios in the bivariate analysis it revealed that; age, education level and salt intake were positively confounded while ethnicity, socioeconomic status, and physical activity level, fish consumption, and Family history of HTN were negatively confounded. Education level in our study may be confounded with age because most of illiterates were of old age, however even after adjustment it's still showed significant association a previous study showed that the level of education remained inversely associated with SBP even after adjustment for age [26]. For ethnicity, physical activity level, and family history of hypertension the association was somewhat enhanced and this may clarify the agreed association with the previous studies [21], [34], [35], [41] which has been somewhat overshadowed by a potential confounders in crude estimator.

CONCLUSION

The study concluded that hypertension was prevalent in rural Sudan. Age, ethnicity, socio-economic status, level of education and family history of hypertension were the major risk factors of hypertension.

RECOMMENDATION

Due to the silent nature and serious complications of hypertension our study recommend that the large scale screening and treatment programs should be emphasized in addition to specifying a national day every year for hypertension screening accompanied with health education programs in coordination with government, together with medical societies and non-governmental organizations.

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