ISSN No:-2456 –2165

Prevalence and Knowledge of Risk Factors of Hypertension among Inhabitants in Buea Health District, Southwestern Cameroon

Marcelus U. Ajonina [1,4*],Caleche Bongo[2], Kenric B. Ware[3], Carine K. Nfor[1,2], Elvis A. Akomoneh[1,4], Alain C. Djam[2], Sylvester N. Atanga[2]

[1]Meridian Global Education and Research Foundation , Buea, Cameroon
[2]School of Health and Human Services, Saint Monica University, Buea, Cameroon
[3]South University School of Pharmacy, 10 Science Court Columbia, SC 29203, USA
[4]School of Health Sciences, Meridian Global University, Buea, Cameroon

Abstract—Hypertension remains one of the most crucial health problems and the most common chronic non-communicable disease worldwide. Lack of knowledge of the disease risk factors has contribute significantly to the increasing rate of hypertension worldwide. This study was aimed at assessing the prevalence and knowledge of risk factors associated with hypertension in Buea Health District. A community-based cross-sectional survey of a random sample of 322 participants was conducted from March to June 2017. Questionnaire was designed to obtain information from participants on the general knowledge of risk factors. Moreover, blood pressure and BMI were also determined. Data were analyzed using SPSS Statistics 20.0 and were considered significant at P ≤ 0.05. The prevalence of hypertension in this study was 35.7%. Most hypertensive individuals (89.6%) were not aware that they have the disease. The prevalence was higher in urban communities (42.9%) than semi-urban (32.7%) or rural communities (32.1%), (P > 0.23). The knowledge of risk factors of hypertension was reasonable among > 73% of the respondents. However, < 35% could distinguish between modifiable and non-modifiable factors of hypertension (P>0.05). Blood pressure and BMI were significantly associated with knowledge of risk factors of hypertension (P<0.005). Respondents with normal blood pressure tended to be 2.3 times (OR=2.36, 95% CI: 0.561-1.123, P=0.002) more knowledgeable of risk factors of hypertension than hypertensive individuals. Similarly, respondents with normal weight were 4.1 times (OR = 4.12, 95% CI: 3.78– 5.79, P=0.003) more likely to have a good level of knowledge of risk factors of hypertension than their overweight/obese counterparts. The study identified a high prevalence of hypertension in the study area compared to previous studies and gaps in the knowledge of modifiable and non-modifiable risk factors of hypertension among inhabitants of Buea health district. Thus, a need for health education on the risk factors of hypertension to prevent the disease.

Keywords— Prevalence; Hypertension; BMI; Modifiable and Non-Modifiable Risk Factors.

I. INTRODUCTION

Hypertension, also known as high blood pressure, remains one of the most common non-communicable diseases that is a global health challenge with an increasing prevalence amongst adults especially in African countries. Approximately one billion people worldwide are affected with an annual death toll of approximately 7.1 million people [1]. A steady increase in the prevalence of hypertension has been reported in low- and middle-income countries since 2000 with a decrease in high-income countries [2]. According to World Health Organization (WHO), more than 30 million people in Africa present with hypertension with males mostly at risk of infection [3]. Moreover, WHO also predicts that if the condition is not curbed by 2020, three quarters of all deaths in Africa could be attributable to hypertension [1,3].

Most epidemiological studies reported obesity, unhealthy diets and physical inactivity as contributing factors to increased prevalence of hypertension worldwide [4, 5]. In Cameroon, a 5.7% prevalence of hypertension has been recorded in rural settings [6] through 21.9% in semi-urban [7] to 47.5% in urban milieu [8]. Moreover, between 1994 and 2003, the 10-year change showed that the prevalence of hypertension increased from 24.4% to 37.2% in men and from 20.1% to 37.5% in women in rural and urban Cameroonian [9]. This therefore underscores the need for public health intervention to avert the situation. The high prevalence has been attributed to rapid urbanization coupled with sedentary life styles, high rates of obesity, increased salt consumption, diabetes and the use of tobacco [10].

Efforts to control the disease have been directed towards complementary utilization of strategies that target the general population such as sensitization on the need to engage on physical exercise, dietary as well as smoking and drinking habits [11]. Lifestyle interventions are more likely to be successful in reducing risk of hypertension especially among

ISSN No:-2456 –2165

elderly people and those who have a higher risk of developing hypertension compared to those that are younger or have a lower risk [12]. The various efforts and initiatives especially in developing countries to prevent or manage hypertension have been frustrated by barriers that exist at the level of patients, staff or health system and administration [13].

Hypertension is a disease related to unhealth behaviors, including smoking, poor diet, overweight and obesity, alcohol consumption, physical inactivity and occupational lifestyle. Some risk factors for hypertension are modifiable, such as smoking, diet, and overweight, whereas some are non-modifiable, such as old age and genetic predisposition [14]. Changing modifiable risk factors may lessen the burden of hypertension through proper sensitization on the knowledge of these factors. However, it has been shown barriers such as lack of formal school education, inaccessibility to routine health education programs and communication gaps are barriers to awareness of these factors especially in rural and minority populations [15]. Though it is a preventable disease, the high prevalence noticed in developing countries is largely due to lack of knowledge on control measures. Inhabitants in urban area have engaged in sedentary life style with limited physical exercise thereby exposing them to risk of developing the disease Prevention plays a significant role in controlling this disease which is achieved by increasing the knowledge and awareness of the public and changing their attitude and practice.

II. AIM

The aim of this study was to assess the prevalence and knowledge of risk factor of hypertension among inhabitants in Buea health district.

III. MATERIALS AND METHOD

A. Study Area

This study was conducted in the Buea health district, southwest region of Cameroon. BHD is one among the 4 and 18 districts of the Fako division and southwest region, respectively with an estimated human population of 147842 inhabitants, with 58.2% ≥ 17 years [16]. The district is situated at latitude 4.15° North longitude 9.24° East, and 15 km from the Atlantic Ocean. It covers a total surface area of 870 square km [17]. There are sixty-seven communities in the district, some of which are rural while others are urban. Indigenes of the district are of the Bakweri tribe and part of the Bantu ethnic group [18]. However, the area attracts individuals from other tribes and ethnic groups including the Semi-Bantu and Foulbe from all over the country for farming, business and studies. The district also houses Mt. Cameroon, the highest mountain in west and central Africa that served as a touristic site for most foreigners visiting Cameroon [18].

B. Study Design and Sampling Technique

The study conducted from March to June 2017 was a community-based cross-sectional survey of randomly selected inhabitants aged above 20 years duly resident in either Muea, Molyko, Buea Road, Tole or Bokova health areas were eligible for inclusion into the study. The minimum sample size for this cross-sectional study was calculated based on the Olorunfemi Amoran approach [19]. This approach takes into consideration a 5% error margin and 95% CL thus: $n = \frac{Z\alpha^2 pq}{d^2}$

Where

n = sample size,

$Z\alpha$ = standard normal deviate, set at 1.96 (for 95% confidence level),

d = desired degree of accuracy 5% (0.050) and

p = the estimate of the prevalence of hypertension in the study area. BHD being a semi-urban area, previous studies had reported a prevalence of 21.9% in the study area [7].

q = 1-p. This gives

$(1.96)^2$ x 0.22 x 0.78/ $(0.05)^2$ = 264. Adjustment for a 20% rate of non-responses and invalid responses yielded a final sample size of 317 from the selected health areas.

A multi-stage and probability proportion to size (PPS) sampling methods were used to collect data from five health areas of Buea health district classified either as urban, semi-urban or rural [18]. Each selected health area constituted a cluster. In each health area, at least three communities were randomly chosen by picking from the listing of all the neighborhoods that make up each health area. In each randomly selected community, households with individual above 20 years were visited. The number of households to be visited for each health area and was determined by considering the proportion of the population of the health area/ community to the total population under study.

C. Method of Data Collection

a). Questionnaire Design and Administration

The descriptive cross-sectional study was also conducted in the five selected health areas using structured questionnaire. The questionnaire was designed to obtain information from participants of age > 20 years on knowledge signs and symptoms, preventive measures as well as risk factors of hypertension. The first part of the questionnaire was structured to contain aspect of basic demographics including age group, marital status, level of education, occupation, etc. The second part was structured to capture information regarding knowledge of signs and symptoms, preventive measures as well as risk factors of hypertension

In addition to the researcher, four skilled research assistants (interviewers) were recruited and trained to administer the structured questionnaire. They were trained on the tools to be used, purpose of the study and how to approach respondents and obtain consent. Data were collected by face-to-face interviews of respondents above 20 years of age randomly selected from households within communities of each health area. Research assistants were dispatched to various areas in pairs. Prior to data collection, the purpose of the study was carefully explained to the respondent and his/her verbal informed consent obtained before the questionnaire was

ISSN No:-2456 –2165

administered. Completeness of the questionnaires was ensured in the field by ensuring that all questions administered and answered were properly entered in the allotted space provided in the questionnaire.

b). Anthropometric Assessment for Body Mass Index (BMI) Determination

The weight was taken using a calibrated weighing scale and the height was measured using a portable measuring tape. BMI was determined according to the Wealth Health Organization standard protocol for anthropometric measurements [20]. A portable anthropometric digital scale (150 kilograms maximum capacity and accuracy to 0.1 kilograms) was used to measure the body mass (in kilograms). An anthropometric tape was used to measure height (in meters). The individual's weight (in kilograms) divided by the squared height (in meters) was used to compute body mass index (BMI). The values were classified into: normal weight, when BMI >18.50 to 24.99 kg/m^2; overweight, when BMI ≥ 25 to 29.99 kg/m^2; and obese when BMI ≥30 kg/m^2 [21].

c). Blood Pressure Measurement

Blood pressure was measured according to the standardized procedure prescribed by American Heart Association guidelines [21]. All the blood pressure measurements were taken by trained researchers to minimize variation in the readings using a mercury column sphygmomanometer (first and fifth phases of Korotkoff sounds taken as systolic (SBP) and diastolic blood pressure (DBP), respectively) after the participants had rested for 5 minutes in sitting position. This procedure was repeated after 5 minutes and an average of the two readings taken. Positive diagnosis of hypertension was made when the systolic blood pressure was ≥ 140mmHg and/or diastolic blood pressure ≥ 90mmHg [3,21].

D. Data Entry and Analysis

Data were double entered in Microsoft Excel and analyzed using SPSS Statistics 20.0 (IBM Corp, Atlanta, GA, USA). Descriptive statistics were carried out to measure percentages, averages, and relative frequencies of the variables. Relationships between quantitative variables, such as prevalence, knowledge of risk factors of hypertension were assessed using the Pearson's Chi-Squared ($\chi 2$) test at 95% confidence interval (CI). The variables that were significantly associated with prevalence and risk factors of hypertension were analyzed using binary logistic regression, and only variables with a significance threshold of less than 0.05 were included in the final model. Results were reported as adjusted odd ratios (OR) together with their confidence intervals. Statistical level of significance was set at $P \leq 0.05$.

E. Ethical Consideration

The study was approved by the Institutional Review Board of Saint Monica University (Certificate No.SMU-031117-RSP issued at 2017-03-11). Administrative authorizations were sought from the South West Regional Delegation of Public Health and the Buea District Health Service (R11/MINSANTE/SWR/RDPH/PS/40/709). Only individuals who volunteered to participate by signing a written informed consent, after adequate sensitization were enrolled.

IV. RESULTS

A. Characteristics of the Study Population

Table 1 summarizes the demographic characteristics of the study participants. A total of 322 respondents aged 20-90 years old were enrolled. Majority of respondents were males (64%) aged < 30 years (42.2%), married (49.1%), of secondary level of education (41.3%), self-employed (45.3%), with Christianity as religion (90.1%), from the Muea health area (31.4%) and from urban communities (34.8%).

variables		Frequency(n)	Percent (%)
Gender	Male	206	64
	Female	116	36
Age group	<30	136	42.2
	30-49	110	34.2
	50-69	54	16.8
	≥70	22	6.8
Marital Status	Single	151	46.9
	Married	158	49.1
	Cohabitation	13	4
Occupation	Student	53	16.8
	Civil Servant	46	14.3
	Self-employed	146	45.3
	Farmers	54	16.8
	None	23	7.1
Religion	Christianity	290	90.1
	Muslim	14	4.3
	Others	12	3.7
Area of Residence	Muea	101	31.4
	Molyko	58	18
	Buea Road	54	16.8
	Tole	55	17.1
	Bokova	54	16.8
Community Type	Urban	112	34.8
	Semi-urban	101	31.4
	Rural	109	33.9

Table 1- Demographic Characteristics of the Study Population (N = 322)

B. Prevalence of Hypertension and BMI

The prevalence of hypertension in the study population was 35.7% (115). Most hypertensive individuals (89.6%) were not aware that they have the disease. Majority 77 (67%) had mild

ISSN No:-2456 –2165

hypertension, 25 (21.7%) had moderate hypertension and 13 (13.3%) had severe hypertension and 207 (64.3%) were normotensive (Table 2). Figure 1 shows that the mean BMI of the study population was 26.55± 5.21. Eleven (3.4%) were underweight, 113 (35.1%) were overweight, 67 (20.8%) were obese and overall, the prevalence of overweight/ obesity was found to be 55.9%.

Blood Pressure (mmHg)	**Frequency (n)**
Normal	207 (64.3%)
Mild hypertension	77(23.9%)
Moderate hypertension	25(7.8%)
Severe hypertension	13(4.0%)

Table 2: Classification of Hypertension in the Study Population

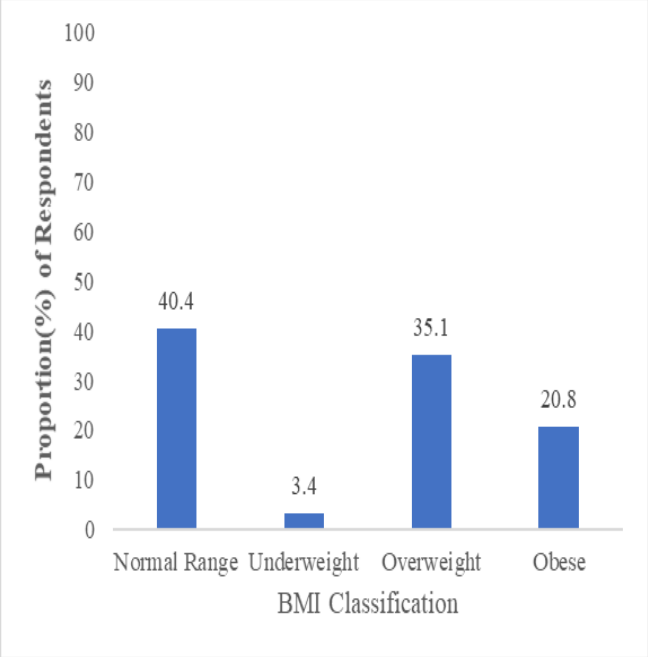

Fig 1: BMI Classification in the Study Population

C. Association between Hypertension and BMI

BMI was significantly associated with hypertension (P< 0.01). Majority of respondents who were hypertensive (41.4%) were either overweight or obese compared to their counterparts (28.4%), (Fig.2)

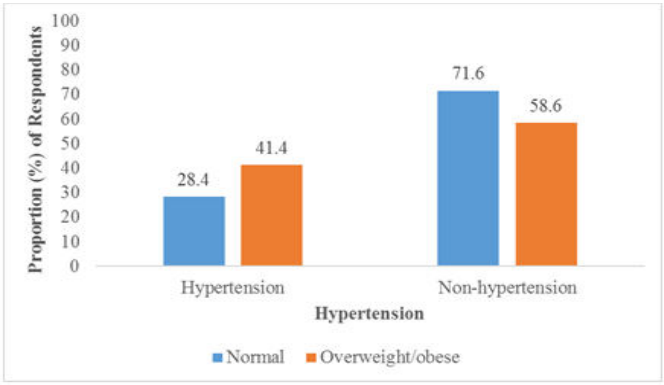

Figure 2: Association between Hypertension and BMI

Table 3 shows that more males [79(38%)] were hypertensive as compared to female [36(31%)] though the difference was not statistically significant (P > 0.05). Similarly, gender was significantly associated with overweight/obesity (P<0.001), (Table 4). Though females [38(32.8%)] were less overweight compared to males [75(36.4%)], they tended to be 2.8 times more obese [36(31%) than males [31 (15.0)] (OR =2.81, 95% CI: 5.51-8.82). Hypertension increased steadily with age from 22.1% in the < 30 age range to 50% recorded in the > 70 age range (P<0.001). Respondents who were in the 30-49 age range (39.1%) were more likely to be overweight/obsessed than respondents of the <30 years (36.8%), between 50-69 years (27.8%) or ≥ 70 years of age (27.8%) (P<0.001). Stratification according to marital status further revealed that respondents that were married tended to be more hypertensive [71(44.9%)] than those that were single [41(27.2%)] or cohabiting [13(4.0%)] (P>0.000). Similarly, respondents who were married (27.8%) were more likely to be obese than unmarried respondents (23.1%), (P<0.05). Hypertension prevalence was higher among civil servants [23(50%)] and respondents that were self-employed [62(42.5%)] and lower among farmers [15(27.8%)]. It was also observed that respondents with tertiary level of education (31.6%) were more obese than their counterparts. Hypertension and overweight/obesity were not significantly associated with religion type (P > 0.05). Stratification according to community type revealed that respondents living in urban areas [947(42.9%)] tended to be more hypertensive and overweight/obesity than respondent living in semi-urban areas or rural areas though the relationships were not significant (P > 0.05).

D. Knowledge of Risk Factors of Hypertension

Of the 322 participants, being overweight, high salt intake, high alcohol intake, smoking and stress were identified were identified as risk factors by 310 (96.3%), 281(87.3%), 273(84.5%),273 (73.6%) and 221(68.6%), respectively. Two hundred and forty-one (74.8%), considered ethnic background as a risk factor for hypertension, and 124 (38.5%) family history. Gender and age were considered as risk factors by 121(37.6%) and 103(32.0%)respectively. The overall knowledge of non-modifiable [113(35.1%)] risk factors was better than that of modifiable risk factors [95 (29.5), (Table 5).

Risk Factors	Frequency (n)
Smoking	237(73.6%)
Stress	221(68.6%)
High salt intake	281(87.3%)
Alcohol intake	272(84.5%)
High blood cholesterol.	112(34.7%)
being overweight	310(96.3%)
Age	103(32.0%)
Gender	121(37.6%)
Ethnic background	241(74.8%)
Family history	124(38.5%)

Table 5: Knowledge of Risk Factors of Hypertension

Demographics		Hypertension [n (%)]	Level of Significance	
			Chi-square	P-value
Gender	Male	79((38.3)	1.73	0.116
	Female	36(31)		
Age group	<30	30(22.1)	19.37	0.000
	30-49	49(44.5)		
	50-69	25(46.3)		
	≥70	11(50)		
Marital Status	Single	41(27.2)	11.57	0.003
	Married	71(44.9)		
	Cohabitation	13(4.0)		
Occupation	Student	12(22.6)	17.56	0.002
	Civil Servant	23(50)		
	Self-employed	62(42.5)		
	Farmers	15(27.8)		
	None	3(13.0)		
Religion	Christianity	101(34.8)	7.92	0.019
	Muslim	2(14.3)		
	Others	8(66.7)		
Community Type	Urban	47(42.9)	2.92	0.231
	Semi-urban	33(32.7)		
	Rural	35(32.1)		

Table 3: Demographic Factors and Prevalence of Hypertension (N = 322)

Demographics		Normal	Overweight	Obesity	P-value
Gender	Male	95(46.1)	75(36.4)	31(15.0)	0.002
	Female	36 (31)	38(32.8)	36(31)	
Age group	<30	63 (46.3)	50(36.8)	17(12.5)	0.0001
	30-49	33(30)	43(39.1)	34(30.9)	
	50-69	28(51.9)	15(27.8)	9(16.7)	
	≥70	7(31.8)	5(22.7)	7(31.8)	
Marital Status	Single	72(47.7)	57(37.7)	20(13.2)	0.004
	Married	56(35.4)	49(31)	44(27.8)	
	Cohabitation	3(23.1)	7(53.8)	3(23.1)	
Occupation	Student	29(54.7)	16(30.2)	5(9.4)	0.194
	Civil Servant	18(39.1)	11(23.9)	15(32.6)	
	Self-employed	52(35.6)	58(39.7)	31(21.2)	
	Farmers	23(42.6)	19(35.2)	12(22.2)	
Religion	Christianity	118(40.7)	102(35.2)	60(33.3)	0.325
	Muslim	4(28.6)	8(57.1)	1(7.1)	
	Others	6(50)	2(16.7)	4(20.7)	
Community Type	Urban	39(38.4)	40(35.7)	31(27.7)	0.28
	Semi-urban	42(41.6)	38(37.6)	17(16.8)	
	Rural	131(40.7)	113(35.1)	67(20.8)	

Table 4: Prevalence of Overweight and Obesity in the Study Population

E. Association between Knowledge of Risk Factors and Demographic Variables

The risk factors discussed above were put together to assess the level of knowledge of risk factors of hypertension. A participant with correct responses for at least six of the aspects was considered to have a good level of knowledge or less was considered to have poor level of knowledge of risk factors respectively. The majority [237 (73.6 %)] of respondents had good, while 85 (26.4%) had poor levels of knowledge of risk factors of hypertension.

Table 6 shows the association between the knowledge of risk factors with demographic and other variables. There was no association between good knowledge of risk factors of hypertension and demographic variables (P>0.05). Good knowledge of risk factors of hypertension was significantly associated with blood pressure (P=0.04). Respondents with normal blood pressure tended to be 2.3 times (OR=2.36, 95% CI: 0.561-1.123, P=0.002) more knowledgeable than hypertensive individuals. Similarly, the level of good knowledge of risk factors was significantly higher among respondents with normal weight than overweight or obese respondents (P=0.003). Respondents with normal weight were 4.1 times (OR = 4.12, 95% CI: 3.78– 5.79) more likely to have a good level of knowledge of risk factors of hypertension than their overweight/obese counterparts.

V. DISCUSSION

Hypertension is a potentially life-threatening disease that can lead to cerebral vascular accidents, myocardial infarctions, congestive heart failure, peripheral vascular disease, and chronic renal failure, and if left untreated and or undetected could lead to significant disability adjusted life years. The control of hypertension remains a global challenge accounting for about 80% of death worldwide [22]. The present study assessed the prevalence and knowledge of risk factors associated with hypertension among inhabitants in BHD to identify the gap thereby demonstrate the need for enforcement of client education on the risk factors of the disease and serve as a baseline for recommendation of health promotion.

The prevalence of hypertension in this study was 35.7%. These results were higher when compared to studies conducted by [6,23,24] in Cameroon suggesting that the prevalence of hypertension is increasing steadily over the years. Though there was no observed disparity between hypertension and community type, our results further reveal that the prevalence of hypertension was higher in urban communities (42.9%) than semi-urban (32.7%) or rural communities (32.1%). These results corroborate findings of [6, 23,24] suggesting that the high prevalence is attributed to sedentary life style practice in urban communities as opposed to rural communities in which the inhabitants engage in farming activities that may enhance blood circulation.

In this study, the prevalence of hypertension was found to be higher in male participants than female participants. Similar results were reported in studies conducted by [25, 26,27], which showed a higher prevalence of hypertension in men than in women [25, 26]. This observation may be in part due to differences in behavioral risk factors, smoking, physical activity and BMI. In line with previous research [24, 26], our study also revealed that hypertension prevalence was significantly higher in married respondents than in unmarried or cohabiting individuals. The issue of family, and family burden, in relation to blood pressure cannot be over-emphasized. This may be attributed to increased responsibilities or social stresses faced by married participants [28]. This study also demonstrated that hypertension increases significantly with age group. This result corroborates with findings of Pinto [29] attributing an increase in blood pressure with age to structural changes in the arteries and especially with large artery stiffness. A significant correlation was also observed between BMI and hypertension. Respondents who were hypertensive tended to be either overweight or obese. These findings correlate with Gupta and Kapoor [30] and Jervase et al [31] which support a strong relationship between BMI and blood pressure across developed and developing countries.

This study shows that majority of the respondents were knowledgeable about the risk factors of hypertension. Though majority demonstrated good knowledge of risk factors of hypertension, less than 35% could distinguish between modifiable and non-modifiable risk factors of hypertension. However, the knowledge of modifiable risk factors (28.7%) were lower compared to non-modifiable risk factors (33%) though not statistically significant. These findings contradict studies conducted by Shaikh et al. [32] where knowledge of modifiable risk factors was better than that of non-modifiable risk factors. It was further observed that respondents with poor knowledge of risk factors of hypertension tended to be more hypertensive than those with good knowledge of hypertension. Findings further show a disparity between good knowledge of risk factors of hypertension with blood pressure and BMI. Respondents with normal blood pressure and normal weight were 2.3 times and 4.1 times, respectively more knowledgeable than their hypertensive or overweight/obese counterparts.

VI. CONCLUSION

The present study identified a high prevalence of hypertension in the study area compared to previous studies and gaps in the knowledge of modifiable and non-modifiable risk factors of hypertension among inhabitants of Buea health district thus a need for health education on the risk factors of hypertension to prevent the disease.

VII. ACKNOWLEDGMENT

We thank the participants from the communities in Buea health district who made this study possible by giving their consent. We equally thank Meridian Global Education and Research Foundation (MGERF), Cameroon for funding the project.

REFERENCES

[1]. Addo J, Smeeth L, Leon DA. Hypertension in sub-Saharan Africa: a systematic review. Hypertension. 2007; 1012–1018.

[2]. Gaziano TA. Cardiovascular Disease in the Developing World and Its Cost-Effective Management. Circulation. 2005;112(23):3547–3553

[3]. World Health Organization (WHO). A global brief on hypertension: silent killer, global public health crisis. Geneva: WHO; 2013

[4]. Cunha JP, Marks JW. High blood pressure (hypertension). http://www.medicinenet.com/high_blood_pressure/article.htm (2011). Accessed 18 May 2017.

[5]. Mayega RW, Makumbi F, Rutebemberwa E, Peterson S, Ostenson CG, Tomson G. Modifiable socio-behavioral factors associated with overweight and hypertension among persons aged 35 to 60 years in eastern Uganda. PLoS One. 2012;7: e47632.

[6]. Mbanya JC, Minkoulou EM, Salah JN, Balkau B. (1998). The prevalence of hypertension in rural and urban Cameroon. Inter J Epidemiol.1998; 27(2): 181-5.

[7]. Atashili J. Epidemiology of hypertension in the Fako Division. Inter J. Hypertens. 2010: www.hindawi.com/journals/ijhy/2016/5639146/.

[8]. Dzudie A, Kengne AP, Muna WF. Prevalence, awareness, treatment and control of hypertension in a self-selected sub-Saharan African urban population: a cross-sectional study. BMJ Open. 2012; 2: e001217.

[9]. Feuzeu L, Kengne AP, Balkau B. Ten-year change in blood pressure levels and prevalence of hypertension in urban and rural Cameroon. J Epidemiol Community Health. 2010; 64,360–365.

[10]. Echouffo-Tcheugui JB, Kengne AP. Chronic non-communicable diseases in Cameroon – burden, determinants and current policies. Global Health. 2010; 7: 44.

[11]. Reddy KS, Katan MB. Diet, nutrition and the prevention of hypertension and cardiovascular diseases. Pub Health Nutri. 2007; 7(1A): 167–186.

[12]. Egan BM. Prediction of incident hypertension. Health implications of data mining in the 'Big Data' era. J. Hypertens.2013;31(11): 2123-4.

[13]. Sekokotla D, Steyn K, Bradshaw D, Mbananga N. Hypertension management and surveillance at primary care level: A situational analysis in the Limpopo Province. Cape Town: South Afri Med Res Coun. 2003.

[14]. Jones DA, Dumber CF, Jirovec MM. Medical-surgical nursing: A conceptual approach. McGraw-Hill Kaqakusha Ltd. International student edition. London: Academics; 2003.p. 936-737.

[15]. Mandal PK, Roy AKS, Chitra C, Mallik S, Manna N, & Maplandia. Burden of hypertension and its risk factors in an urban community of India: are we aware and concerned? Sudanese J Pub Health. 2010; 5:130-135.

[16]. Buea Health District (2016). Population Census of Buea health district. District Achieves.

[17]. Nsagha D, Njunda A, Kamga H, Assob J, Bongkem E. HIV-1/HIV-2 Co-infection among voluntary counseling testing subjects at a regional hospital in Cameroon. Afr J Health Sc.2012;12(3): 276–81.

[18]. Communes et Villes Unies du Cameroun (CVUC). http://cvuc.cm/national/index.php/fr/carte-communale/region-du-sud/142-association/carte-administrative/sud-ouest/fako/404-buea (2014). Buea (2014). Accessed May 17, 2017.

[19]. Olorunfemi EA. A comparative analysis of predictors of teenage pregnancy and its prevention in a rural town in Western Nigeria. Inter J Equity Health. 2012: 11, 37.

[20]. World Health Organization (WHO). WHO Anthro 2005 for personal computers manual. Software for assessing. Geneva: WHO; 2005

[21]. Pickering TG, Hall JE, Apple LJ, Falkner BE, Graves J, Hill MN. Recommendations for blood pressure measurement in humans and experimental animals. Hypertension. 2005; 45:142-61.

[22]. WHO. (2017). Cardiovascular disease: new initiative launched to tackle cardiovascular disease, the world's number one killer. WHO factsheet. Geneva: WHO; 2016.

[23]. Kingue K, Ndong NC, Menanga PA, Jingi AM, Noubiap JJN, Fesuh B, et al. Prevalence and risk factors of hypertension in urban areas of Cameroon: a nationwide population-based cross-sectional study. J Clin Hypertens. 2015; 17(10).

[24]. Arrey WT, Dimala CA, Atashili J, Mbuagbaw J & Monekosso GL. Hypertension, an emerging problem in rural Cameroon: prevalence, risk factors, and control. Inter J. Hypertens. 2016: doi.org/10.1155/2016/5639146

[25]. Agyemang C. Rural and urban differences in blood pressure and hypertension in Ghana, West Africa. Public Health. 2006; 120(6): 525–533.

[26]. Alikor CA, Emem-Chioma PC, Odia OJ. Hypertension in a rural community in Rivers State, Niger Delta Region of Nigeria: Prevalence, and risk factors. Nigeria Health Journal. 2013;13(1): 18–25

[27]. Everett B, Zajacova A. Gender differences in hypertension and hypertension awareness among young adults. Biodemography Soc. Biol. 2015; 61(1): 1–17.

[28]. Erhu WO, Olayiwola G, Agbani EO, Omotoso NS. Prevalence of hypertension in a university community in South West Nigeria. Afri. J. Biomed. Res.2005; 8(1),15–19.

[29]. Pinto E. Blood pressure and ageing. Postgrad Med J. 2007;83(976):109–114.

[30]. Gupta S, Kapoor S. Sex differences in blood pressure levels and its association with obesity indices: who is at greater risk. Ethn Dis. 2010; 20(4):370-5.

[31]. Jervase E, Barnabas D, Emeka AG, Osondu N. Sex differences and Relationship between blood pressure and age among the Igbos of Nigeria. Internet J Biol Anthrop. 2009:3-2.

[32]. Shaikh RB, Mathew E, Sreedharan J, Muttappallymyalil J, Sharbatti S, Basha SA. Knowledge regarding risk factors of hypertension among entry year students of a medical university. J Fam Community Med. 2011;18(3): 124–129.R. Nicole, "Title of paper with only first word capitalized," J. Name Stand. Abbrev., in press.

[33]. Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interface," IEEE Transl. J. Magn. Japan, vol. 2, pp. 740-741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 19.