

## Original Research Article

### **RISK FACTORS AND ANTHROPOMETRIC VARIABLES OF YOUNG PEOPLE WITH ESSENTIAL HYPERTENSION IN UYO, AKWA IBOM STATE.**

#### **Abstract**

Hypertension, a chronic medical condition is commonly seen in young people in my environment. Certain risk factors are associated with the development of this condition. They include a positive family history of hypertension, being overweight /obese, excessive alcohol intake, cigarette smoking and high salt intake. The role of micro-RNA, GRK2, CaMKIV and PIA<sup>2</sup> are obvious in the aetio-pathogenesis of hypertension. This study was conducted to find out which of these factors have effect on hypertension on young people.

**Method:** One hundred and fifty one young people diagnosed with essential hypertension(new cases) over a one year period January to December 2013 were recruited from patients attending the general outpatient clinic of the University of Uyo Teaching Hospital. Their age, sex, tribe, occupation and marital status were assessed. Risk factors like cigarette smoking, significant alcohol intake, adding salt to meals before eating, family history of hypertension and history of diabetes mellitus, weight, height, body mass index, hip circumference, waist circumference and blood pressure were assessed.

**Result:** A total of 151 respondents (n=151) were recruited into the study.48 respondents had stage 1 hypertension JNC 7 classification while 103 had stage 2 hypertension JNC 7 classification. More women had hypertension n=84(55.6%). Respondents with secondary level of education had more stage 1 hypertension JNC 7 classification while those respondents with tertiary education had more stage 2 hypertension JNC 7 classification. Married respondents had more of stage 2 hypertension JNC 7 classification n=56(54.4%) than stage 1 hypertension n=22(45.6%). Family history of hypertension was present in n=79(52.3%) respondents. Stage 2 hypertension JNC 7 classification was associated with having a positive family history of hypertension p=0.001. Adding extra salt to serve meals was associated with stage 1 hypertension JNC 7 classification p=0.006. Other risk factors were not significantly associated with any stage of hypertension.

**Conclusion:** Positive family history of hypertension and adding extra salt to serve meals were significant risk factors for hypertension in young persons in this study. So young people with positive family history of hypertension should begin early screening for detection of hypertension and reduce or refrain from adding extra salt to serve meals to reduce risk of developing hypertension.

**Keyword:** *young people, hypertension, risk factors*

36

37 Introduction

38 Hypertension or high blood pressure is a chronic medical condition in which the systemic arterial  
39 blood pressure is elevated.[1] Hypertension is blood pressure reading greater than or equals to  
40 140mmHg Systolic and greater than or equals to 90mmHg Diastolic. [2] JNC 7 classifies  
41 hypertension into normal<120/80mmHg, pre- hypertension 120-130/80-89mmHg, stage 1  
42 hypertension 140-159/90-99mmHg and stage 2 hypertension >160/100mmHg.[ 3] A systolic  
43 blood pressure of <120mmHg is considered ideal with each 10mmHg increase in blood pressure  
44 being accompanied by a 10% greater risk of cardiovascular event and mortality.[4] About one  
45 billion people in the world have Hypertension [ 5] of which young people between the ages of  
46 18 and 44 years constitute 6% ( national health and nutrition evaluation studies 2009-2011).[6]  
47 Hypertension occurs among young people in Nigeria with reported prevalence of 3.3% in South  
48 East region [7], 4.3% in Northern region [8] and 30% in South West region.[9]

49 Certain risk factors are known to predispose people to development of essential hypertension.  
50 These factors include non modifiable factors like age (45 years and above)[ 10], sex (males more  
51 than females until age 65years) [ 10], race (black race) [11] and positive family history [12.13].  
52 Modifiable factors include overweight, obesity, cigarette smoking, excessive alcohol intake and  
53 excessive salt intake. Other factors like micro-RNA, GRK2, CaMKIV and PIA<sup>2</sup>are considered  
54 to play roles in the aetiology of hypertension.

55 Overweight ( $25.0\text{kg/m}^2$  - $29.9\text{kg/m}^2$  and obesity ( $\text{BMI} >30\text{kg/m}^2$ ) are known to predispose to  
56 Hypertension. A study on Africans reported that 6-29% of Hypertension was attributed to  
57 overweight and 1-16% was attributed to obesity. [14] Also, obesity may increase the risk of  
58 hypertension five fold compared to normal weight. [15] Cigarette contains nicotine which is  
59 known to cause release of catecholamine that increase blood pressure and heart rate [16].  
60 Excessive alcohol intake (more than 14 units per week for women and more than 21 units per  
61 week for men) causes an increase in blood pressure [17]; this it does by stimulating the  
62 sympathetic nervous system and increasing adrenocorticoid hormone in circulation [18].  
63 Excessive salt intake more than 6g per day [19] is a known risk factor for hypertension through  
64 its effect on expansion of the extracellular fluid volume, induction of cardiac myoblast and  
65 smooth muscle hypertrophy, activation of NF-Kappa B in proximal tubular cells of the kidney  
66 leading to inflammation and changes in the Renin Angiotensin System as well as induction of  
67 oxidative stress.[20] Calcium/Calmodulin dependent kinase IV (CaMKIV) plays a role in the  
68 regulation of smooth muscle vascular tone through control of endothelial nitric oxide synthase  
69 activity. Impairment of this protein by loss or deletion results in the loss of balance and will lead  
70 to hypertension. [21] Micro-RNA are short (17-25 nucleotides long) single stranded RNA  
71 molecules. They have been implicated in cardiovascular physiology, initiation and progression of  
72 cerebrovascular diseases. Examples of the micro RNA are miR-9, miR-126, miR -143, miR-146 .  
73 The blood levels of the first two correlate with 24 hr mean pulse pressure an established

74 predictor of advanced target organ disease while the last two are known to modulate vascular  
75 smooth muscle function. [22] GRK2 is one of the G protein coupled receptor kinases found on  
76 cell surfaces, it desensitizes B-adrenoceptor which is known to cause vasodilation thereby  
77 causing vasoconstriction leading to hypertension. Young people diagnosed with hypertension  
78 have increased quantity of GRK2 in their blood.[23] Other factors that predispose to  
79 hypertension are sedentary lifestyle, exposure to chronic stress, diabetes mellitus and  
80 dyslipidaemia.

81 Since there is scarcity of study in Uyo, Akwa Ibom State, Nigeria on risk factors for essential  
82 hypertension in young people so this study was undertaken to determine the risk factors and  
83 anthropometric variables of young people diagnosed with essential hypertension with the aim of  
84 filling the knowledge gap and bringing out which risk factors have the significant effect on  
85 young persons who develop essential hypertension.

86

## 87 MATERIALS AND METHODS

88 The study was a cross-sectional descriptive study of young people aged 18-44 years (DSMIV  
89 classification of young people) with essential Hypertension attending the General Outpatient  
90 Clinic of the University of Uyo Teaching Hospital.

91 A semi-structured questionnaire was administered to consenting young people diagnosed with  
92 essential Hypertension. The instrument sought information on age, sex, tribe, occupation and  
93 marital status. The questionnaire also sought information on risk factors like history of cigarette  
94 smoking(current smokers-those that were currently smoking and non smokers- those that never  
95 smoked or used to smoke but stopped smoking at least five years ago), significant alcohol  
96 intake,(men who took more than 21 units of alcohol per week, women who took more than 14  
97 units of alcohol per week , a unit of alcohol was 10 ml of ethanol or 8g of alcohol in various  
98 forms beer, spirits and wine), adding salt to meals on table before eating ( self report by  
99 respondents), exposure to excessive stress on the job, in the family and finance ( self report by  
100 respondents). Other risk factors assessed were family history of Hypertension ( mainly first  
101 degree relatives), personal history of diabetes mellitus and family history of diabetes mellitus.

102 Anthropometric measures - Weight, Height and Body Mass Index, Waist circumference, Hip  
103 circumference and Waist Hip ratio were done for each patient. The weight was done using a  
104 bathroom scale standardized to 0.1kg. Subjects stood on the weighing scale without shoes,  
105 remain upright on the scale with the upper limbs to the sides of the body and the weight was read  
106 to the nearest 0.1kg and recorded.

107 Height was measured with the subjects standing barefooted against an erect metric rule placed on  
108 a perpendicular wall. The subjects stood erect, barefooted, heels together against the wall with  
109 the buttocks and back touching the metric rule. The subjects looked straight ahead and a 30cm

110 metric rule was placed on the head of the subjects to note the height of the subject on the metric  
 111 rule on the wall. The subject moved away from the 30cm metric rule, the height of the subject  
 112 was read at the point of the head piece on the calibrated wall metric rule to nearest 0.1cm. The  
 113 body mass index was calculated using the formula  $BMI = \text{WEIGHT (kg)} / \text{HEIGHT (m}^2\text{)}$ . Waist  
 114 circumference was done with a measuring tape applied to waist line which is the equidistant  
 115 abdominal circumference between the costal margin and the iliac crest. The hip circumference  
 116 which is the widest circumference of the hip was done by measuring the inter-trochanteric  
 117 diameter of the right and left hip.

118 The blood pressure of the subject was measured using Accuson mercury sphygmomanometer  
 119 with cuff of appropriate size in a sitting position. Korotkoff sounds one and five were used as  
 120 systolic and diastolic blood pressure respectively. Two measurements were taken for each  
 121 subject at 5 minutes interval and the mean blood pressure was used for the analysis. Systolic  
 122 blood pressure of 140mmHg and above and Diastolic blood pressure of 90mmHg and above  
 123 were taken as Hypertension [2].

124 Sample population were patients attending the General Outpatients Clinic from where young  
 125 people diagnosed with essential Hypertension were selected. All young people diagnosed with  
 126 essential Hypertension over a period of one year January to December 2013 were selected as  
 127 respondents. Sampling method was consecutive sampling.

128 Exclusion criteria were young persons with secondary hypertension, persons with essential  
 129 hypertension above the age of 44 years, young persons with hypertensive heart failure or those  
 130 with essential hypertension who were too ill to partake in the study. **Informed written consent**  
 131 was received from all subjects selected. Ethical approval was obtained from the Ethical  
 132 Committee of the University of Uyo Teaching Hospital for this study. Data analysis was done  
 133 using SPSS17.0 version. Results are presented as frequencies and proportions, Chi square was  
 134 used while level of significance was set at 0.05.

135

136 Table 1: Socio demographic characteristics of young hypertensive patients attending general out-  
 137 patient clinic in Uyo

Variable	Hypertension		Total	Statistical indices
	Stage 1	Stage 2		
Age group				$\chi^2=2.5425$ Df = 4 P value =0.637
20-24	6 (12.5)	7 (6.8)	13 (8.6)	
25-29	11 (22.9)	21 (20.9)	32 (21.2)	
30- 34	12 (25.0)	28 (27.2)	40 (26.5)	
35—39	11 (22.9)	33 (32.0)	44 (29.1)	
40-44	8 (16.7)	14 (13.6)	22 (14.6)	
Sex				$\chi^2=0.0610$ Df = 1
Male	22 (45.8)	45 (43.7)	67 (44.4)	

Female	26 (54.2)	58 (56.3)	84 (55.6)	P value =0.805
Education				$\chi^2=4.6094$
No education	1 (2.1)	1 (1.0)	2 (1.3)	Df = 3
Primary	4 (8.3)	11 (10.7)	15 (9.9)	P value =0.156*
Secondary	26 (54.2)	38 (36.9)	64 (42.4)	
Tertiary	17 (35.4)	53 (51.5)	70 (46.4)	
Marital status				$\chi^2=0.9627$
Single	25 (52.1)	45 (43.7)	70 (46.4)	Df = 2
Married	22 (45.6)	56 (54.4)	78 (51.7)	P value =0.596*
Widowed	1 (2.1)	2 (1.9)	3 (2.0)	
Occupation				$\chi^2=5.0525$
Applicants	2 (4.2)	8 (7.8)	10 (6.6)	Df = 6
Artisan	7 (14.6)	16 (15.5)	23 (15.2)	P value =0.572*
Civil servants	6 (12.5)	19 (18.5)	25 (16.6)	
Students	13 (27.1)	20 (19.4)	33 (21.8)	
Trading	16 (33.3)	30 (19.4)	46 (30.5)	
Teaching	2 (4.2)	9 (8.7)	11 (7.3)	
Professional	2 (4.2)	1 (1.0)	3 (2.0)	

138

139 Table 1 shows that socio demographic characteristics of both stages of disease are similar among  
140 the respondents.\*= Fishers exact.

141 Table 2: Risk factors associated with stages of hypertension among the respondents attending  
142 general out -patient clinic in Uyo.

Variable	Hypertensive		Total	Statistical indices
	Stage 1	Stage 2		
Family history of Hypertension				$\chi^2=10.1666$
Yes	16 (33.3)	63 (61.2)	79 (52.3)	Df = 1
No	32 (66.7)	40 (38.8)	72 (47.7)	P value =0.001
Known DM				$\chi^2=1.6381$
Yes	5 (10.4)	5 (4.9)	10 (6.6)	Df = 1
No	43 (89.6)	98 (95.2)	141 (93.4)	P value =0.290*
Alcohol consumption				$\chi^2=1.6381$
Not significant	44 (91.7)	90 (87.4)	134 (88.7)	Df = 1
Significant	4 (8.3)	13 (12.6)	17 (11.3)	P value =0.584*
Smoking				$\chi^2=0.3314$
Yes	1 (2.1)	4 (3.9)	5 (3.3)	Df = 1
No	47 (97.9)	99 (96.1)	146 (96.7)	P value =1.000*
Extra salt				$\chi^2=7.5115$

Yes	32 (66.7)	59 (57.3)	75 (49.7)	Df = 1
No	16 (33.3)	44 (42.7)	76 (50.3)	P value =0.006

143

144 Table 2 shows that family history of hypertension is associated with stage -2 disease and adding  
 145 extra salt to food is associated with stage 1 disease.\*=Fishers exact.

146

147 Table 3: Anthropometric variables of young hypertensive respondents attending general out-  
 148 patients clinic in Uyo

Variables	Hypertension		Total	Statistical indices
	Stage 1	Stage 2		
Weight (kg) Mean (SD)	75.3 (11.8)	73.1 (12.9)	73.8 (12.5)	tt=0.9972 Df = 149 P value =0.320
Height (cm) Mean (SD)	164.9 (9.2)	162.5 (7.9)	163.3 (8.4)	tt=1.6933 Df = 149 P value =0.0925
BMI (kg/m2) Normal Overweight Obese	14 (29.2) 18 (37.5) 16 (33.3)	35 (34.0) 36 (35.0) 32 (31.1)	49 (32.5) 54 (35.8) 48 (31.8)	$\chi^2=0.3461$ Df = 2 P value =0.841
Waist circumference Median (interquartile range)	91 (20)	88 (15)	89 (16)	Z=1.088 P value= 0.2768
Waist hip ratio Normal Abnormal	36 (75.0) 12 (25.0)	87 (84.5) 16 (15.5)	123 (81.5) 28 (18.5)	$\chi^2=1.9423$ Df = 1 P value =0.163

149

150 **Result:**

151 A total of one hundred and fifty one (n=151) respondents were recruited into the study. 48  
 152 respondents had stage 1 hypertension while 103 had stage 2 hypertension (JNC7). More women  
 153 had hypertension n=84 (55.6%) with n=58 (56.3%) of them having stage 2 hypertension. More  
 154 respondents n=26(54.2%) with secondary level of education had stage 1 hypertension while  
 155 n=53(51.5%) with tertiary level of education had stage 2 hypertension. Married respondents  
 156 n=78(51.7%) had hypertension ( n=22(45.6%) had stage 1 and n=56(54.4%) had stage 2).Traders  
 157 n=46(30.5%) were more than other respondents in occupation. See details in table one

158 Family history of hypertension was present in n=79(52.3%) while n=72(47.7%) respondents did  
159 not have any family history of hypertension. Stage 2 hypertension was associated with having a  
160 positive family history of hypertension, p=0.001. Most of the respondents did not have co-  
161 morbid diabetes mellitus n=141(93.4%) and having diabetes mellitus was not associated with  
162 stage 1 or 2 hypertension. Majority of the respondents did not take significant alcohol  
163 n=134(88.7%), did not smoke cigarette n=146(96.7%), but n=75(49.7%) added extra salt to meal  
164 on table before eating and it was associated with stage 1 hypertension p=0.006.

165 Mean weight of respondents was 73.8kg (12.5 SD), mean height of respondents was 163cm  
166 (8.4SD), n=54(35.8%) were overweight, median waist circumference was 89cm and waist hip  
167 ratio was normal in n=123(81.5%). There was no significant statistical association between  
168 hypertension and anthropometric variables in young people in this study.

169

## 170 **Discussion**

171 Essential hypertension was not commonly diagnosed in young people previously but is presently  
172 commonly seen in many centers. Previously, hypertension in a young person was diagnosed as  
173 secondary hypertension until proven otherwise. This study of 151 young persons with  
174 hypertension showed that essential hypertension was commoner among young females than  
175 young males compared to previously held views that hypertension was commoner among males  
176 until age 65 when it becomes more common among females. The finding of this study agrees  
177 with the work of Ulasi et al that found that hypertension was commoner among young women  
178 aged 20-30 years than young males [24].

179 On educational level of respondents diagnosed with essential hypertension, previous studies  
180 showed that the less educated a respondent was, the more likely the person to develop essential  
181 hypertension. This is supported by the work of Harvard school of public health on African  
182 Americans that showed that low educational level was a risk factor for hypertension [25]. Wang  
183 et al also found that respondents with low level education had greater frequency of hypertension  
184 27.7% while those with middle level education (18.8%), and higher level of education had less  
185 frequency of hypertension (15.8%) [26]. However, in this study the reverse was found. Few  
186 respondents with low level education or no education at all n=17(11.2%) had hypertension while  
187 those respondents with middle and higher level of education had higher frequency of  
188 hypertension n=134(88.8). **The finding from this study collaborates the work of Tedesco et al  
189 that found that most hypertensive had higher education [27].** The finding of hypertension among  
190 highly educated people in my environment may be due to adoption of western lifestyle and  
191 behavior.

192 Family history of hypertension is an additive risk factor for development of essential  
193 hypertension. This study found positive family history of hypertension a significant risk factor  
194 for development of stage 2 JNC 7 hypertension in young people p=0.001. Van der Sande et al

195 had reported that people with a positive family history of hypertension were likely to develop  
196 hypertension at a younger age [28]. Also Ranasinghe et al found the prevalence of hypertension  
197 to be significantly higher in subjects with family history of hypertension than those without a  
198 family history [29]. In addition, positive family history of hypertension is a predictor of  
199 increased susceptibility to hypertension because of interaction between genetic trait,  
200 environmental factors and behavior.

201 High salt diet is another risk factor for developing hypertension. The relationship between salt  
202 intake and blood pressure is direct and progressive as there is a dose response relationship  
203 between salt intake and blood pressure in the range of 3 to 12g of salt intake per day [30].  
204 Though ,some studies say only those individuals with salt sensitivity develop hypertension with  
205 increase salt intake [31] : this study found a relationship between adding extra salt to meal before  
206 eating and stage one hypertension JNC 7 classification p= 0.006 maybe those with this response  
207 are salt sensitive.

208 Obesity increases the risk of development of hypertension; numerous clinical and animal studies  
209 have confirmed a strong relationship between obesity and hypertension [32]. There was no  
210 significant relationship between obesity and hypertension in this study even-though n=54(35.8%)  
211 respondents were overweight. . Micro-RNA, GRK2, CaMKIV and PIA<sup>2</sup> are considered to play  
212 roles in the aetiology of hypertension, these proteins could not be measured in the blood of the  
213 respondents in my environment due to our poor resources.

214 The use of self report to measure some risk factors like the quantity of salt added to meals may  
215 be a limitation in this study due to recall bias though this was controlled by asking how many  
216 shakes were done into the meal.

217 **Conclusion:** Young people affected by hypertension are frequently seen in my environment.  
218 Many factors are known to be associated with development of hypertension at a younger age but  
219 amongst them, having a positive family history of hypertension and adding extra salt to serve  
220 meals were significant. So, regular screening of young people with family members with  
221 hypertension and desisting from adding extra salt to serve meals will be beneficial.

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