International Journal of Community Medicine and Public Health
Umegbolu EI et al. Int J Community Med Public Health. 2016 Oct;3(10):2825-2831
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20163368

Research Article

Primary hypertension in young adults (18-40 years) in Enugu State, Southeast Nigeria: a cross-sectional study

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Received: 02 August 2016
Revised: 08 September 2016
Accepted: 08 September 2016

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ABSTRACT

Background: Hypertension (HTN) is defined as a blood pressure (BP) ≥140/90 mm Hg. The prevalence and mortality from HTN, globally and locally, have been on the increase since the 1980s. This study aimed to detect young adults (18-40 years) in Enugu State who are hypertensive, in order to raise the awareness that HTN is also common in young adults. Its early diagnosis and management could help to reverse the trend in the number of cases of HTN in Nigeria which had been predicted could hit 39.1 million by 2030 if the present trend is allowed to continue.
Methods: Participants were administered with structured questionnaire. Their BPs, heights and weights were measured using sphygmomanometer, stadiometer and scale balance respectively. Data were analyzed as proportions, Pearson product moment correlations and Chi square tests using MaxStat (version 3.60) statistical software.
Results: The overall prevalence of HTN was 21.3%; 20.7% in the 18-29 years age group; 25.9% in the 30-40 years age group; 24.3%, in males; and 20.3% in females. Pearson product moment correlation coefficient r between age and HTN=0.462, between sex and HTN=0.328, between family history and HTN = 0.513, between salt intake and HTN=0.613, between BMI and HTN=0.152, between physical activity and HTN=0.293, between smoking and HTN=0.308.
Conclusions: HTN in young adults is more common than previously thought and if unmanaged in early life usually progresses to HTN later in life.

Keywords: Blood pressure, Hypertension, Primary, Youth

INTRODUCTION

Hypertension (HTN) is marked by the presence of a chronic elevation of systemic arterial pressure above a certain threshold value and defined as systolic blood pressure (SBP) ≥140 mm Hg or diastolic blood pressure (DBP) ≥90 mm Hg.[1]

Studies have shown that cardiovascular risks associated with chronic elevation of the BP begin to manifest above a critical BP level of 115/75 mm Hg.[2] Target organs for HTN include the kidney, heart, blood vessels, brain and the eye. Risks associated with HTN include end stage renal disease, accelerated development of coronary artery disease, myocardial infarction, congestive heart failure, stroke, peripheral vascular disease, ruptured aortic aneurysm and retinopathy.[3]

Primary (essential, idiopathic) HTN, which is of unknown origin, affects between 90-95% of patients diagnosed with HTN and develops as a result of interplay between genetic, environmental and behavioural factors.[4-6] Most cases of HTN are asymptomatic, that is why HTN has been dubbed the 'silent killer'.

The prevalence of HTN globally is about 30% - 40%, and is the leading global risk factor for death or disability.[7-10] The reported prevalence of HTN all around the world has been on the increase since the 1980s, causing about 7.1 - 9.4 million deaths annually.[8-9,11-13,] In fact, between 1980 and 2008, cases of HTN had increased from 600 million to 1 billion, and has continued to increase since then. Overall, high-income countries have lower prevalence of HTN (35%) than other groups (40%).[12]

In Nigeria, the overall prevalence of HTN ranges from 8%-46.6% (27.3% on the average), with almost equal male to female ratio.[15-17] In 2010, about 20.8 million cases of HTN were estimated in Nigeria and it has been projected that this could increase to 39.1 million by 2030 if the present trend continues.[17]

In Eastern Nigeria, a prevalence rate ranging from 12.3% to 30.86% has been reported.[18-20] Globally, HTN among young adults (aged 18-40 years) ranges from 1.8% to 20%.[21-27] These emerging statistics about HTN are really worrisome. Therefore, health care professionals need to also watch out for HTN in young adults as studies have shown that the prevalence of HTN in this category of individuals constitutes more than half the global overall figure. Studies have also shown that untreated primary HTN in young adults frequently continues into adulthood; and early identification and management of HTN in the youth may help to reduce premature morbidity and mortality in later life.[3]

In Nigeria, HTN in young adults aged 18-40 is a problem lacking relevant attention because it is still erroneously considered a disease of the old and aging people. This study therefore aims to detect those hypertensive young adults (18-40 years) in Enugu State with previously undiagnosed HTN in order to raise the awareness that HTN is not solely a disease of the aged as presently misconceived. Early detection and proper management of HTN in these young adult Nigerians could help to reverse the present trend so that the number of cases of HTN in the country would not hit 39.1 million by 2030 as has been projected. [17]

METHODS

A cross-section of the population was studied, using accidental sampling technique (a non-probability sampling technique) and convenience sampling method. 441 participants, made up of 111 males and 330 females aged 18-40 years were recruited into the study. 387 participants were aged between 18-29 years, while 54 made up the 30-40 years age group.

The study participants included students of some selected tertiary institutions in the state, members of staff of some selected secondary schools, artisans and those attending various government hospitals in the state. Included in the study were persons not previously diagnosed with HTN, not on anti-hypertensives, not pregnant, not on systemic oral contraceptives, not diabetic and without overt kidney diseases. Pregnant women, those already diagnosed with HTN and are currently on anti HTN medications, those with overt kidney diseases, diabetes mellitus and women on systemic oral contraceptives were excluded from the study.

Each participant completed a structured questionnaire, after which his/her BP, body weight and height were measured and recorded. Method of measuring the BP was a modification of that outlined by, using a mercury-in-glass sphygmomanometer with standard cuff of correct size, after the participant had been seated for at least five minutes, legs uncrossed, and with the arm supported at the heart level.[3] The BP was measured two times, alternately on both arms at an interval of five minutes and the average of the two measurements taken as the participant's BP.

For the height measurement, the participant stood with the back against the stadiometer and the sliding part was lowered until it touched his or her head. The height of each participant was measured in centimetre and later converted to metres for the purpose of calculating the body mass index (BMI). To measure the weight, the participant stood on a mobile bathroom scale balance, facing the investigator and looking straight ahead. The weight in kilogramme was then recorded by the investigator as soon as the swinging indicator of the scale balance had come to rest.

The primary data for the study were generated from the structured questionnaire, BP, body weight and height measurements over a period of four months (February 2016-June 2016). The questionnaire was tested in a pilot study involving a small group of patients (40 in all) attending two District Hospitals in the State, from December 2015-January 2016.

RESULTS

A total of 441 participants made up of 111 (25.2%) males and 330 (74.8%) females aged 18-40 years were used in the study. Majority of the study participants, 387 (87.8%) were aged 18-29 years, while 54 (12.2%) were aged 30-40 years.

Table 1: Prevalence of HTN.

Normal BP	Pre HTN	HTN
290 (65.8%)	57 (12.9%)	94 (21.3%)

Table 1 shows the overall prevalence of hypertension and pre-hypertension among the study participants. The prevalence of HTN was found to be higher with a rate of 21.3% (94) compared to that of pre-HTN which was 12.9%. 65.8% (290) had normal BP. In Table 2, the effect of age on the prevalence of HTN is shown. It was observed that 14 of the 54 (25.9%) study participants aged 30-40 years were hypertensive, compared to 80 of

the 387 (20.7%) in the 18-29 years group who were also found to be hypertensive. This clearly shows that the prevalence of HTN was higher in the participants aged 30-40 years (25.9%) compared to those in the 18-29 years age group (20.7%). The correlation between age and HTN was positive and moderate (r=0.462), but not significant (p=0.36). The effect of sex on the prevalence of HTN is shown in Table 3. The result shows that 27 of the 111 (24.3%) males were hypertensive, compared to 67 of the 330 (20.3%) females who were also found to be hypertensive. From the result, it is evident that the prevalence of HTN was higher in the males (24.3%) compared to the females (20.3%). However, the effect of sex correlated weakly and positively with the prevalence of HTN (r=0.328), but was not significant (p=0.53).

Table 2: Prevalence of HTN according to age.

Age group (years)	Variable (HTN)			
	Yes	No	r	X^2
18-29	80 (20.7%)	307 (79.3%)	0.462	0.498
30-40	14 (25.9%)	40 (74.1%)		
p-value			0.3567	0.4803

Table 3: Prevalence of HTN according to sex.

Sex	Variable (HTN)			
	Yes	No	r	X^2
Male	27 (24.3%)	84 (75.7%)	0.328	0.579
Female	67 (20.3%)	263 (79.7%)		
p-value			0.5256	0.4467

Table 4 shows the effect of family history of HTN on the prevalence of HTN among the study participants. 28 of the 100 (28%) participants with positive family history of HTN were hypertensive, compared to 66 of the 341 (19.4%) without family history of HTN who were also found to be hypertensive. The result shows that the prevalence of HTN was markedly higher among the participants with positive family history of HTN (28%) compared to the participants without family of HTN (19.4%).

Table 4: Relationship between family history of HTN and HTN.

Family history of HTN	Variable (HTN)			
	Yes	No	r	X^2
Present	28 (28%)	72 (72%)	0.513	2.950
Absent	66 (19.4%)	275 (80.6%)		
p-value			0.2982	0.0859

Table 5: Relationship between salt intake and HTN.

Salt intake (addition of salt after cooking)	Variable (HTN)			
	Yes	No	r	X^2
Added salt	30 (29.4%)	72 (70.6%)	0.613	4.577
No added salt	64 (18.9%)	275 (81.1%)		
p-value			0.1958	0.0324

The correlation between family history of HTN and HTN was positive and strong (r=0513), but not significant (p=0.30). The effect of salt intake on the prevalence of HTN is shown in Table 5. It was observed that 30 of the 102 (29.4%) study participants who added salt to food after cooking were hypertensive, compared to 64 of the 339 (18.9%) who did not add salt to food after cooking who were also found to be hypertensive. The result has revealed a higher prevalence of HTN among the study participants who added salt to food after cooking (29.4%)

compared to those who did not add salt to food after cooking that were also hypertensive (18.9%). Addition of salt to food after cooking correlated positively and strongly (r=0.613) with the prevalence of HTN and the association of addition of salt to food after cooking and HTN was also significant (X2 =4.577, p=0.03). In Table 6, the effect of body weight on the prevalence of HTN is shown. Among the participants that were overweight/obese (BMI 25.00- ≥40.00), 32 of 147 (21.8%) were hypertensive, compared to 60 of the 281 (21.4%) with normal body weights (BMI 18.50-24.99) and 2 of the 13 (15.4%) who were underweight (BMI <18.50) that were also found to be hypertensive. The result shows a progressive rise in the prevalence of HTN among the study participants as body weights increased. However, BMI correlated very weakly with HTN (r=0.152) and the correlation was not significant (p=0.77).

Table 6: Relationship between BMI and HTN.

BMI	Variable (HTN)			
	Yes	No	r	X^2
<18.50 (underweight)	2 (15.4%)	11 (84.6%)	0.152	0.009
18.50-24.99 (normal weight)	60 (21.4%)	221 (78.6%)		
25.00- ≥40 (overweight/obesity)	32 (21.8%)	115 (78.2%)		
p-value			0.7741	0.9238

The effect of physical activity on the prevalence of HTN is shown in Table 7. Among the study participants who were physically active, 76 of 353 (21.5%) were hypertensive, compared to 18 of 88 (20.5%) of those that were not physically active who were also found to be hypertensive. The prevalence of hypertension in the two categories of the study participants was almost equal. The correlation between physical activity and HTN was positive, weak (r=0.293) and not significant (p=0.57).

The effect of smoking on the prevalence of HTN is shown in Table 8. Among the participants who smoked, 5 of 11 (45.5%) were hypertensive, compared to 89 of the 430 (20.7%) who did not smoke who were also found to be hypertensive. The prevalence of HTN was observed to be much higher among the smoking participants (45.5%) compared to their non-smoking counterparts (20.7%). However, the correlation between smoking and HTN was positive, weak (r=0.308) and not significant (p=0.55)

Table 7: Relationship between physical activity and HTN.

Physical activity	Variable (HTN)			
	Yes	No	r	X^2
Active	76 (21.5%)	277 (78.5%)	0.293	0.006
Inactive	18 (20.5%)	70 (79.5%)		
p-value			0.5730	0.9403

Table 8: Relationship between smoking and HTN.

Smoking	Variable (HTN)			
	Yes	No	r	X^2
Active smoking	5 (45.5%)	6 (54.5%)	0.308	2.582
Non-smoking	89 (20.7%)	341 (79.3%)		
p-value			0.5522	0.1081

DISCUSSION

Primary HTN, defined as a raised BP ≥140/90 mm Hg, not caused by any underlying disease, is as common in young adults as in old people. Studies from around the world have shown that the prevalence of primary HTN among young adults (aged 18-40 years) ranges from 1.8% to about 20%.[21,26] The present study has shown a prevalence rate of 21.3% for HTN in young adults aged 18-40 years in Enugu state (Table 1) which is comparable to what had been reported by similar studies from other parts of the world.[21,26] The hypertensinogenic, or risk factors for the development of HTN, considered in this study include age, sex, family history of HTN (heredity), salt intake, obesity (measured by body mass index) (BMI), physical activity level and smoking habit.

Recognition of these hypertensinogenic factors is important, for it may allow non-pharmacologic prevention, treatment, or cure of HTN.[29] Studies have shown that the prevalence of HTN increases with increasing age, such that one of every two adults older than 60 years of age has HTN.[14] Indeed, the life-long risk of developing HTN in normotensives after the sixth decade of life is approximately 90%.[31]

Our study has also shown that the prevalence of HTN increased with age as, 20.7% of the study participants aged18-29 years and 25.9% of those aged 30-40 years were hypertensive. However, the correlation between HTN and age was moderate (r=0.462), but not significant (p=0.36).

Rising prevalence of HTN as age of the participants increased found in this study was in conformity with what had already been reported about primary HTN elsewhere around the world.[3,14,30] This rise in the prevalence of HTN with age could partly be attributed to an increase in the plasma level of norepinephrine found in both normotensive and hypertensive as age increases as suggested by.[35] Probably the increase is more marked in hypertensives than in normotensives, hence the observed difference.

Prevalence of HTN is not the same for men and women for all ages. Studies have shown that a higher percentage of men than women have high BP until age 45, the prevalence being similar between the ages of 45-54, and a reversal occurring after the age of 54, when women overtake men.[28,30,32] Our study has also revealed that more men (24.3%) than women (20.3%) were hypertensive (Table 3).

The correlation between sex and HTN (r=0.328) was positive, weak and not significant (p=0.53). Our finding is consistent with what had already been previously reported in similar studies by and.[28,30,32] It has been suggested that the observed difference in BP among men and women across ages and ethnicities could be as a result of the differences in the gonadal steroid profile and sex chromosomes.[36] Animal studies have also provided strong evidence that oestradiol is an antihypertensive sex hormone, whereas testosterone is prohypertensive, both of these acting through direct effects on vascular, renal and heart cells, as well as being mediated by humoral factors.[37]

Of all the factors that predispose to HTN, genetic factors, which are non-modifiable by nature, have been shown to play a leading role. Studies have indicated that about 25-40% of cases of primary HTN is genetically determined.[33] As a matter of fact, primary HTN is associated with a strong family history (70-80% positive family history), and if present in both parents, risk in offspring is increased by 250%.[4] Present study has revealed that more participants (28%) with positive family history of HTN than those without family history of HTN (19.4%) were hypertensive. There was also a strong correlation between family history of HTN and HTN (r= 0.513), although it was not significant (p=0.30). Our finding is in agreement with what had already been reported in similar studies by and concerning the role of genetic factors in the causation of HTN.[4,33]

Salt intake (dietary sodium) is also a major hypertensinogenic factor. It has been postulated that primary HTN and age-related increases in BP are virtually absent in populations in which individual consumption of sodium chloride is less than 50 mmol/day, for HTN is observed mainly in populations in which people consume more than 100 mmol of sodium chloride per day.[34]

From an evolutionary point of view, humans are said to have been adapted to ingest and excrete less than 1 g of sodium (2.5 g of salt) per day, that is why primary HTN develops when the kidneys become unable to excrete the amount of sodium ingested, unless BP is increased.[6] The upper limit of dietary sodium intake is 2,400mg per day.[14]

The present study has revealed that more study participants (29.4%) who added salt to food after cooking than those who did not (18.9%) were hypertensive. The correlation between salt intake and HTN (r=0.613) was positive and strong. The association between salt intake and HTN was also significant (X^2= 4.577, p=0.3). This finding is in tandem with what had already been previously reported by [34] concerning salt intake and HTN.

On obesity, especially the abdominal type, as a major hypertensinogenic factor, studies have shown that each 10% weight gain is associated with a 6.5mm Hg increase in systolic BP.[29] As reported by a direct association between HTN and BMI has been observed and a BMI of less than 25 which is considered normal has no noticeable effect on the BP, whereas a BMI of 26-28 (as compared with BMI <25) increases the risk of high BP by 180% and the risk of insulin resistance by >1000%.[29]

However, the mechanism by which obesity raises BP is not fully understood, but it has been shown that increased BMI is associated with an increase in plasma volume and cardiac output.[29]

Present study has shown a gradual rise in the prevalence of HTN among the study participants as BMI increased (15.4% for BMI < 18.50, 21.4% for BMI 18.50-24.99, and 21.8% for BMI 25.00 - >40.00). The correlation between BMI and HTN (r=0.152) was positive, very weak and not significant (p= 0.77). Also, the association between BMI and HTN in this study was not significant (X^2 =0.009, p=0.92). The study could not demonstrate any strong association between BMI and HTN as previously reported by.[29,30] Although the role of physical activity level in the control of HTN has been demonstrated in several past studies, the underlying mechanisms responsible for this reduction in BP by

exercise training still remain elusive and controversial. However, reductions in cardiac output, sympathetic nerve activity, plasma norepinephrine levels and total peripheral resistance have been reported.[28]

As a single risk factor, physical inactivity is believed to be responsible for 5-13% of HTN today.[8] A single episode of physical activity can yield an acute lowering of BP, the so-called post-exercise hypotension.[8] Accumulation of 30-60 minutes of moderate intensity dynamic exercise (e.g. brisk walking, jogging, cycling, or swimming) 4-7 days per week is considered adequate.[10] Lifestyle interventions (including increasing physical activity level) are more likely to be successful and the absolute reductions in risk of HTN are likely to be greater when targeted in persons who are older and those who have a higher risk of developing HTN compared with their counterparts who are younger or have a lower risk.[14]

Our study has shown that the prevalence of HTN in those that were physically active (21.5%) was almost the same as in those not physically active (20.5%) (Table7). This apparent lack of difference in the prevalence of HTN between the two groups is consistent with the results of previous studies which had demonstrated that lifestyle modification activities, especially physical activity, are usually more successful in older people with higher risk of developing HTN, compared to younger ones with lower risks.[14]

The last hypertensinogenic factor examined by our study was smoking. The role of smoking as a risk factor for development of primary HTN still remains to be established, even though smoking is known to be an important risk factor for coronary artery disease.[30] Present study revealed that 45.5% of the participants who smoked and 20.7% of their non-smoking counterparts had HTN (Table 8). Although there was no strong correlation between smoking and HTN (r=0.308), findings from the study probably demonstrated the vaso-constricting effect of nicotine on the vascular wall. This action of nicotine can lead to an increase in the total peripheral resistance, hence the observed higher BP in smokers, compared to non-smokers.

CONCLUSION

The present study has shown a prevalence rate of 21.3% for primary HTN in young adults aged 18-40 years in Enugu State. Of all the hypertensinogenic factors considered in this study, excessive salt intake (r =0.613) and family history of HTN (r =0.513) correlated strongly with the development of HTN in young adults aged 18-40 years in Enugu State. A prevalence rate of 21.3% for primary HTN found in this study shows that primary HTN in young adults in Enugu State, and by extension in Nigeria, is not a disease of old people after all as presently misconceived. Therefore, awareness on the need for periodic monitoring of young adults' BPs in Nigeria in general, and Enugu State in particular, needs to be raised to enable early detection and proper management of these young hypertensive adults. This could help to halt the current progressive trend in the prevalence of HTN in the country.

Limitations of the study

Some of the limitations to this study include:

- Difficulty in recruiting enough male participants to match the females for age because in many Nigerian tertiary institutions the majority of the students are females
- Difficulty in recruiting enough participants from the 30-40 years age group for at this age most people have already left the tertiary institutions and people of this age hardly present to the hospitals because they enjoy relatively better health than the older persons
- Difficulty in assembling the artisans in designated places because they have scattered types of settlement
- Cumbersome and time consuming process of administration of the questionnaire to the artisans who are mostly illiterates and semi-literates

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Umegbolu EI, Ogamba JO. Primary hypertension in young adults (18-40 years) in Enugu State, Southeast Nigeria: a cross-sectional study. Int J Community Med Public Health 2016;3:2825-31.