



## Comparative Analysis of Clinical History, Sociodemographic, Behavioural Factors and Cardiovascular Risk Factors among Hypertensive in Awka, Nigeria

Chidinma Ifeyinwa Mmaju<sup>1</sup>, Peter Osezele Okonudo<sup>1\*</sup>, Gladys Ahaneku<sup>2</sup>  
and Ufoaroh Chinyelu Uchenna<sup>2</sup>

<sup>1</sup>Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.

<sup>2</sup>Department of Internal Medicine, Faculty of Clinical Sciences, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.

### Authors' contributions

This work was carried out in collaboration among all authors. Author CIM designed the study, performed the statistical analysis and wrote the protocol. Author POO managed the literature searches and wrote the first draft of the manuscript. Authors GA and UCU managed the analyses of the study. All authors read and approved the final manuscript.

### Article Information

DOI: 10.9734/JAMMR/2019/v31i630303

Editor(s):

(1) Dr. Muhammad Torequl Islam, Assistant Professor, Department of Pharmacy, Faculty of Life Science, Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Bangladesh and Researcher, Ton Duc Thang University, Vietnam.

Reviewers:

(1) Umezurike Benedict Chidozie, Nigeria.

(2) Ochieng O. Anthony, Sumait University, Tanzania.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/53073>

Original Research Article

Received 28 September 2019

Accepted 03 December 2019

Published 10 December 2019

### ABSTRACT

**Background:** Hypertension is a major modifiable risk factor for cardiovascular diseases and research studies done in Nigeria observed prevalence rate of hypertension to range from 26.4% to 36.9%.

**Aim:** This study aimed to evaluate the sociodemographic, clinical, behavioral and cardiovascular risk factors associated with hypertension in Awka, South East, Nigeria.

**Methods:** Cross-sectional study was used. 391 participants aged from 18 years above were recruited for this study. Structured questionnaires were constructed in line with World Health

\*Corresponding author: E-mail: peterokonudo@gmail.com ;

Organization Step approach was utilized for data collection. Hypertension was defined as systolic blood pressure  $\geq 140$  mmHg and Diastolic blood pressure  $\geq 90$  mmHg. Chi-square and independent sample T test were used to test comparison between two groups.

**Results:** The mean age of the subjects was  $45.87 \pm 17$ . 49.33.7% of retired subjects has the highest prevalence was statistically associated with hypertension in occupational status of the subjects, marital status was statically significant with hypertension and prevalence of hypertension among the subjects were 81.1%, 8.5%, 8.6% for married, single and divorcee respectively, ( $P < 0.001$ ) and also no association was observed between hypertension and subjects that occasionally use high salt often ( $\chi^2 = 0.341$ ,  $P > 0.001$ ).

**Conclusion:** The study showed that age, family history of hypertension, consistent increase in blood pressure, occupational and marital status are associated risk factors of hypertension in Awka, South East, Nigeria. There is need to create awareness on the risk factors and encourage changes in sedentary life style.

*Keywords: Hypertension; risk factors; prevalence; blood pressure.*

## 1. INTRODUCTION

Hypertension is a major public health problem with increasing level of cardiovascular mortality and morbidity both in developed and developing countries [1,2]. The prevalence of hypertension is on the increase. It has been projected that by the year 2025, the global prevalence of hypertension would be about 29.4% (about 1.54 billion people) [3]. Africa has the highest prevalence of hypertension and as such, it is described as a disease for Africa [4]. About 90% of diagnosed cases of hypertension are primary hypertension and 10% are secondary hypertension [2]. Several risk factors are associated with primary hypertension although the cause is yet unknown [4]. These factors are characterized into modifiable and non-modifiable risk factors [5]. The modifiable risk factors of hypertension are those attributes of an individual that can be adjusted or changed [6,7]. These includes: obesity, alcohol consumption, tobacco use, lack of exercise etc. The non-modifiable risk are attributes of an individual that cannot be changed. This includes sex, family history, genetic composition race [8,9,10]. Hypertension if not properly controlled and managed may lead to cardiovascular complications which include coronary heart disease, heart failure, renal damage, ischemic heart disease, strokes [11,12]. Previous studies showed a positive relationship of cardiovascular risk factor and hypertension and suggested implementation management of cardiovascular disease and prevention policy; this includes management of obesity, blood pressure, lipid and glucose metabolism, increase physical activity, strictly compliance of drug complication [13]. In Nigeria, complications of hypertension attributes to 25% of all emergency admission in health institutions [12]. This has

been proven to be associated to individuals who are unaware of their health condition or whose conditions were poorly managed [2].

Few research studies have been done in south-south and south-east Nigeria and have shown prevalence rate of hypertension and its complications ranges from 21% and 21.3% respectively [14]. However, there is need to explore more on associated risk factors with hypertension. This study aimed to evaluate the sociodemographic, clinical and behavioral factors that are associated with hypertension in Awka, South east, Nigeria.

## 2. METHODS

### 2.1 Study Population

A total of three hundred and ninety-one subjects ( $n=391$ ) were recruited for this research study and comprises of Male ( $n=181$ ) and female ( $n=210$ ). This research study was carried out in Chukwuemeka Odimegwu Ojukwu University Teaching Hospital, Awka at General Outpatient Department (GOPD). A cross-sectional design study was used. The research study participants were adults aged from 18 years and above. This study was carried out between November 2018 to April 2019.

### 2.2 Assessment of Associated Risk Factors

Structured questionnaires were constructed in line with WHO Steps Instrument 1 and 2 [15]. Informed consents were obtained from each participant and also explained what it is being used for and its importance. The questionnaire consists of two steps parts.

Step 1; the first part consisted of socio-demographic, clinical history and behavioral life styles variables of each participant. These variables includes; age, smoking habit, alcohol consumption, dietary habit, physical activity, duration of being hypertensive, diabetes mellitus status, used medication, stress strain, and family history of being hypertensive. Smoking habit variable were grouped into two groups; smokers and non smokers. Alcohol consumption was grouped into two; alcohol drinkers and non alcoholic drinkers. Physical activity was assessed using IPAQ. Job stress, financial instability, Family distress, sleep inadequacy were all grouped under stress strain [16].

Step 2; captured the anthropometric measurements and Body Mass Index (BMI). BMI was determined as  $\text{weight/height}^2$  ( $\text{Kg/M}^2$ ). Height and weight was measured using a stadiometer. In measuring height, participants were made to remove their shoes, stand on top of the stadiometer scale, standing erect, facing forward and height measured from the meter rule. Also, weight was measured during the procedure. BMI were classified according to WHO standard; in four groups. They are underweight ( $<18.5 \text{ kg/m}^2$ ), normal weight ( $18.5 - 24.9 \text{ kg/m}^2$ ), overweight ( $25-29.9 \text{ kg/m}^2$ ) and obesity ( $>30 \text{ kg/m}^2$ ). Blood pressure measurements were taken using sphygmomanometer. Participants were asked to sit on a chair with their feet flat on the floor and left arm made to rest on the upper arm and participants assured to be calm. Auscultation was done over the brachial artery with a stethoscope. The first appearance of korotkoff sounds as the cuff swings was taken as systolic and the disappearance of the sounds taken as diastolic [16]. Blood pressure measurements were recorded in mmHg. This procedure was measured for three times over a period of 3 minutes. Subjects were classified hypertensive if their blood pressure were greater or equal to 140 mmHg (systolic) and 90 mmHg (Diastolic) [17]. Pulse rate was also gotten from participants using a Pulse oximeter. The Right thumb is placed inside the pulse oximeter and the participant assured to be calm when the pulse rate is taken.

Socio-economic status was also taken. Their occupational status was grouped into civil servants, public servants, Business, Applicant, and Retired. Marital status was also grouped into; Married, Single, Divorced, Widowed.

Participants were assured of Oath of secrecy and well explained that it is voluntary and has the right to withdraw from the study if need be. Participants that were found to be hypertensive through BP readings were informed, counseled and urged to commence treatment as soon as possible. Data generated we analyzed using statistical package for social sciences version 21 software. Chi square test was used to test comparison between the two groups and independent sample T test for normally distributed data and also for comparison, value  $<0.001$  was taken as to be statistically significant.

### 3. RESULTS AND DISCUSSION

A total of three hundred and ninety one subjects comprising of 181(46.3%) male and 210(53.7%) females participated in this study. The mean (SD) age of all subjects was  $45.87 \pm 17$ .

In this cross-sectional study, the prevalence of hypertension was 24.0%. This finding is consistent with earlier reports by [18,19,20]. This consistency in prevalence rate is a cause for concern especially in a country like Nigeria that is struggling with the issue of over population. This is so because with a constant prevalent rate of hypertension in a continuous growing population in Nigeria, more and more people are becoming hypertensive.

#### 3.1 Study Population According to Their Demographic and Clinical Characteristics

Table 1 shows the result of frequency distribution of clinical variables. Respondents who had family history of hypertension were 101(25.8%) compared to 290(74.2%) of respondents who had no traits of hypertension. 317(81.1%) of the subject study presented with a normal heart rhythm while 68(17.4%) presented with heart rhythm greater than 100 beats per/minute. 285(72.9%) of the participants had their systolic blood pressure  $\leq 140$  mmHg compared with 106(27.1%) of the participants had their systolic pressure  $\geq 140$  mmHg. Likewise, 274(70.1%) of the subjects had their diastolic blood pressure  $\leq 90$  mmHg compared to 117(29.9%) of the subjects with diastolic blood pressure  $\geq 90$  mmHg. 90(23.0%) of the subjects had their age range between 28-37 compared to other age range.

**Table 1. Study population according to their demographic and clinical characteristics**

<b>Clinical variables</b>	<b>N(391)</b>	<b>%</b>
Family History of hypertension	101	25.8
No with Family History	90	74.2
<b>Heart rate</b>		
Bradycardia	6	1.15
Normal Heart Rhythm	317	81.1
Tachycardia	68	17.4
<b>Systolic</b>		
≤140mmHg	285	72.9
≥140mmHg	106	27.1
<b>Diastolic</b>		
≤90mmHg	274	70.1
≥90mmHg	117	29.9
<b>Sex</b>		
Male	181	46.3
Female	210	53.7
<b>Age</b>		
18-27	67	17.1
28-37	90	23.0
38-47	70	17.9
48-57	47	12.0
58-67	57	14.6
68-77	44	11.3

### 3.2 Relationship between Socio-demographic Characteristics and Prevalence of Hypertension

In occupational status of subjects, 31(33.7%) of retired subject had the highest prevalence and was statistically associated with hypertension, ( $P < 0.001$ ) (Table 2). Male subjects had high prevalence 51(54.3%) compared to female subjects 43(45.7%), the difference was not statically significant ( $\chi^2 = 3.151$ ,  $P > 0.001$ ). Prevalence of hypertension was slightly different from 58(53.4%) subjects who responded to pass through stress compared to 36(38.3%) subjects that responded not to have pass through stress, thus the difference was statistically insignificant ( $\chi^2 = 6.490$ ,  $P > 0.001$ ). Marital status was significantly associated with hypertension, ( $P < 0.001$ ) and prevalence of hypertension was highest among married participants 77(81.9%) followed by widowed 9(8.6%) and single participants 8(8.5%). Prevalence of hypertension were higher with participants admitted to be involved in physical activities 64(68.1%) than those participants that are not involved in physical activity 30(31.9%), the difference between hypertension and physical activity was statically insignificant ( $\chi^2 = 11.917$ ,  $df = 2$ ,  $P > 0.001$ ).

The results data demonstrated a strong significant association between age and

hypertension. Increase in age has been found to be a risk predictor of hypertension [21]. This findings are consistent with the study results on prevalence of hypertension and associated factors among residents in Ibadan, Nigeria [18], prevalence of hypertension in Akwa Ibom, South-South, Nigeria [1] and similar study conducted in Anambra, Nigeria [20]. Stress and hypertension showed no linear relationship as P value is  $> 0.001$ . Exposure to chronic stress has been stated as risk factors/biomarker of hypertension. Chronic stress stimulates the release of cortisol which increases cardiovascular reactivity in the body. This results finding are contrary with a study that observed a positive association between stress and hypertension in their study of sociodemographic correlates of hypertension in a rural setting of Oyo state, Nigeria. [16] Also, results data expressed a significant relationship between hypertension and economic status. Prevalence of hypertension were seen more among retired (33.7%), followed by public servants and business people with the same percentage rate (27.2%). This study findings agreed with the study carried out by [2], however noted a slight difference in prevalence rate of hypertension to have been more among minor retailers (60.7%). This may be attributed to the study population. Prevalence of hypertension were higher among married subjects (81.9%) when compared to other status; widowed (8.5%), single (8.5%) and also observed a significant

association between hypertension and marital status. These findings are similar with the findings on a survey of hypertension and its socio-economic factors in a market population, Awka, Nigeria [2]. There have been varying reports on the association of hypertension with sex. However, this study observed no positive association between hypertension and Gender. In females, cardiac output is less than in males because of less blood volume and so cardiac index is more than in males, because of less body surface area. Increased in cardiac output has been noted to be strongly associated with hypertension. This result is consistent with a study carried out by [2].

### 3.3 Association between Behavioral Risk Factors and Hypertension

No significant association was observed between hypertension and Subjects that are strong

addicts to alcohol (df =1,  $\chi^2=1.527$ ,  $P>0.001$ ) and subjects that are strong addicts to smoking (df=1,  $\chi^2=0.256$ ,  $P>0.001$ ) (Table 3). There was also no positive association between hypertension and subjects that takes high vegetable (df=2,  $\chi^2=0.6999$ ,  $P>0.001$ ) and subjects that occasionally use salt often (df=1,  $\chi^2=0.341$ ,  $P>0.001$ ). The effect of smoking on hypertension is transient. Another report found no association between smoking and hypertension. Our findings suggests that smoking is not an associated risk factor in the study population.

This study observed insignificant association between increased salt intake and hypertension. Increased salt intake had been positively associated with progression of cardiovascular disorders. A study had a contrary study that observed high salt intake to be associated with progression of cardiovascular and renal dysfunction, suggesting high salt intake to be a

**Table 2. Relationship between sociodemographic characteristics and prevalence of hypertension**

Sociodemographic variables (N=391)	Hypertension		Total	df	$\chi^2$	P
	No	Yes				
<b>Sex</b>						
Male	130(43.8)	51(54.3)	94(100.0)	1	3.151	0.076
Female	167(56.2)	43(45.7)	297(100.0)			
<b>Marital status</b>						
Married	186(62.6)	77(81.9)	263(67.3)	2	34.458	0.000*
Single	106(35.7)	8(8.5)	114(29.2)			
Widoed	5(1.7)	9(8.6)	14(3.6)			
<b>Occupation</b>						
Civil servant	59(20.3)	11(12.0)	70(18.3)	6	33.476	0.000*
Public servant	117(40.2)	25(27.2)	142(37.1)			
Business	70(24.1)	25(27.2)	95(24.8)			
Applicant	10(3.4)	0(0.0)	10(2.6)			
Retired	31(10.7)	31(33.7)	62(16.2)			
Student	2(0.7)	0(0.0)	2(0.5)			
Housewife	2(0.7)	0(0.0)	2(0.5)			
<b>Age</b>						
18-27	67(22.6)	0(0.0)	67(17.1)	6	83.317	0.000*
28-37	82(27.6)	8(8.5)	90(23.0)			
38-47	58(19.5)	12(12.8)	58(19.5)			
48-57	33(11.1)	14(14.9)	47(12.0)			
58-67	27(9.1)	30(31.9)	57(14.6)			
68-77	23(7.7)	21(22.3)	44(11.3)			
78->	9(9.6)	7(2.4)	16(14.1)			
<b>Stress</b>						
Stress	138(46.6)	58(61.7)	196(50.3)	1	6.490	0.011
No Stress	158(53.4)	36(38.3)	194(49.7)			
<b>Physical activity</b>						
Physical Activity	249(83.8)	64(68.1)	313(80.1)	2	11.917	0.003
No Physical Activity	47(15.8)	30(31.9)	77(19.7)			

*P<0.001 is considered statistically significant.*

**Table 3. Association between behavioral risk factors and hypertension**

Behavioral factors	Hypertension		Total	df	$\chi^2$	P
	No	Yes				
<b>Alcohol addicts</b>						
Yes	61(20.5)	25(26.6)	86(22.0)	1	1.527	0.217
No	236(79.5)	69(73.4)	305(78.0)			
<b>Smoke addicts</b>						
Yes	13(4.4)	3(3.2)	16(4.1)	1	0.256	0.613
No	284(95.6)	91(96.8)	375(95.9)			
<b>Vegetable intake</b>						
High	155(52.2)	48(51.1)	203(51.9)	2	0.699	0.705
Low	140(47.1)	46(48.9)	18(47.6)			
<b>Salt intake</b>						
High	107(36.0)	37(39.4)	144(36.8)	1	0.341	0.559
Low	109(64.0)	57(60.6)	247(63.2)			

potential risk factor of hypertension. Increased vegetable consumption and hypertension showed no statistically significant association. This findings is contrary with a meta-analysis study carried out and six other research studies. One of the studies revealed an inverse association while the other five research studies were not statistically significant [22]. This suggests that salt intake and vegetable consumption are not determining factors in this study population. Vegetables are high in potassium, magnesium, vitamin, folic acid and carotenoid. Research studies reported it to lower blood pressure through vasodilatation, improve endothelial function and increase antioxidant activity [23,24].

### 3.4 Comparative Analysis of Clinical Factors, between Hypertension and Their Control

Table 4 shows the comparison between hypertension and clinical risk factors. The mean (SD) systolic pressure of hypertensive subjects (143.02±33.484) were increased compared to Normotensive subjects (117.62±25.570) and the difference were statistically significant (P<0.001). The mean (SD) diastolic pressure of hypertensive subjects (84.93±20.069) of normotensive subjects, there was significant

association with hypertension, (P<0.001). Also, the relationship between subjects that have family history of hypertension and hypertension was statistically significant, P<0.001.

Heart rate was not statistically significant with hypertension in this study, P value is >0.001. This result is contrary to a research findings that suggest heart rate is strongly associated with peripheral and central blood pressures [25]. Heart rate is an independent risk factor of cardiovascular disease with high mortality rate among hypertensive subjects [25]. A clinical study had observed patients with increase heart rate are more likely to develop atherosclerosis and acute coronary syndromes [26]. Also recent studies analyzed an increased heart rate is frequently associated with high blood pressure, obesity, dyslipidemia and increase haematocrit. However, this finding is in contrast with [21] that explains heart rate greater than 80 beats per minute has a positive association with hypertension. This study demonstrated a strong positive association between participants that has family history of hypertension and hypertension, P<0.001. This finding is consistent with the study that reported a statistically significant association between hypertension and family history [2,15].

**Table 4. Comparative analysis of clinical factors, between hypertension and their control**

Clinical factors	Hypertensive (Mean/STD)	Nomotensive (Mean/STD)	P value
Heart Rate	91.66± 19.905	85.26±16.063	0.002
Systolic	143.02±33.484	117.62±25.570	0.000*
Diastolic	84.93±20.069	78.26±14.172	0.000*
Family History	1.48±0.502	1.82±0.382	0.000*
B.M.I.	2.96±0.802	2.95±0.729	0.959

\*P<0.001 is considered statistically significant

#### 4. CONCLUSION

This study observed that family history of hypertension, marital status, and occupational status, is associated to increase in blood pressure and increase in age may be positively associated with hypertension and a cardiovascular risk factor in Awka, Nigeria. This calls for an increase sensitization and an improved health policy on these associated risk factors.

#### CONSENT

As per international standard, patient's written consent has been collected and preserved by the author(s).

#### ETHICAL APPROVAL

This research study was reviewed and approved by the Ethical committee of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Amaku Awka with Ref No: COOUTH/AA/Vol.1.001.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Effiong A, Udeme E, Anime I. Prevalence of hypertension in Akwa Ibom State, South-South Nigeria: Rural versus urban communities study. *International Journal of Hypertension*; 2015. Article ID: 975819. Available:<http://dx.doi.org/10.1155/2015/975819>
2. Anyabolu E, Okoye I, Chukwudi A. Hypertension and its socioeconomic factors in a market population in Awka Nigeria. *American Journal of Medical Sciences and Medicine*. 2017;5(3):40-48.
3. Janssen I, Katzmarzyk PT, Ross R. Body mass index, waist circumference, and health risk: Evidence in support of current National Institutes of Health guidelines. *Arch Intern Med*. 2002;162:2074-79.
4. Ibekwe RU. Modifiable risk factors of hypertension and socio-demographic profile in Oghara, Delta State; Prevalence and correlates. *Annals of Medical and Health Sciences Research*. 2015;5(1):71-77.
5. Mayega RW, Makumbi F, Utebemberua RE, Peterson S, Ostnson 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. [Pub Med]
6. Sani MU, Wahab KW, Yusuf BO, Gbadamosi M. Modifiable cardiovascular risk factors among apparently healthy adult Nigeria population. *Across Sectional Stud BMC Es Nots*. 2010;3:11. [Pub Med]
7. Abedy, Abu-Haddaf S. Risk factors of hypertension of UNRWA primary health care centres in Gaza Governments ISRN *Epidemol*. 213;10:760-69.
8. Ulasi II, Ijioma CK, Onuwbere BJ, Arodiwe E, Onodugo O, Okafor C. High prevalence and low awareness of hypertension in a market population in Enugu, Nigeria. *Int J Hypten*. 2011;869675.
9. Stanley S, Nathan D. Hypertension and cardiovascular disease: Contributions of the Framingham heart study. *Global Heart*. 2013;8(1):49-57.
10. Ugwuja EI, Ezenkwa US, Nwibo AN, Ogbanshi M, Idoko O, Nwabu R. Prevalence and determinants of hypertension in an Agrarian rural community in South-East Nigeria. *Ann Med Health Sciences*. 201;5(1):45-49.
11. Henderson AD, Beau B, Nanc J, Valie B. Hypertension related eye abnormalities and risk of stroke. *Rev Neurol Dis*. 2011;8(1-2):19.
12. Ogah OS, Okpechi I, Chukwunonye LL, Akinyemi JO, Onwubere BJ, Falase AO. Blood pressure, prevalence of hypertension and hypertension related complications. *Nigerian Africans: A review*. *World J Cardiol*. 2012;4:327-40.
13. Theresea Tiffe, Martin Wagner, Peter Henschmen. Control of cardiovascular risk factors and its determinants in the general population. Findings from the STAB Cohort Study. Available:<http://creativecommons.org/licenses/by/4.0>
14. Onwuchekwa AC, Chineye S. Clinical profile of hypertension at a University Teaching Hospital in Nigeria. *Vasc Health Risk Management*. 2010;6:511-516.
15. WHO. The WHO stepwise approach to chronic disease risk factor Surveillance. Geneva; WHO Press. 2011;1-4.
16. Saliu Abdulsalam, Adenike Olugbenga-Bello, Olakunle Olarewaju, Ismail Abdus-

- Salam. Socio demographic correlates of modifiable risk factors for hypertension in a rural local Government Area of Oyo State South West Nigeria. *International Journal of Hypertension*; 2014.  
Article ID: 842028  
Available:<http://dx.doi.org/10.1155.2014/842028>
17. Chobanian AV, Bakris GI, Black HR. The seventh report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure: The JNC 7 report. *Journal of the American Medical Association*. 2003;289(19):2560-2572.
  18. Ikeoluwapo O. Ajayi, Ibukun Opeyemi Sowemimo, Onoja Matthew Akpa. Prevalence of hypertension and associated factors among residents of Ibadan-North Local Government Area of Nigeria; 2016.  
Available:<http://www.nigicardiol.org>
  19. Egbi OG, Rotifa S, Jumbo J. Prevalence of hypertension and its correlates among employee of a tertiary hospital in Yenogoa, Nigeria. *Ann of Afr Medd*. 2015;14(1):8-17.
  20. Ezekwesili CN, Ononamadu CJ, Onyeukwu OF, Mefoh NC. Epidemiological survey of hypertension in Anambra State, Nigeria. *Niger J. Clinical Pract*. 2016;19:659-67.
  21. Adebayo RA, Balagun MO, Adedoyin RA, Obashono John, Bisiriyun LA, Abiodiun OO. Prevalence of hypertension in three rural communities of Ife North Local Government Area. *International Journal of General Medicine*. 2013;6:863-868.
  22. Bingrong Li, Fang Li, Longfeui Wang, Dongferry Zhang. Fruits and vegetable consumption and risk of hypertension. *The Journal of Clinical Hypertension*. 2016;18(5).  
Available:<http://doi.org/10.1111/jch.12777>
  23. Kearney PM, Whelton M, Reynolds K. Global burden of hypertension: Analysis of world wide data. *Lancet*. 2015;365:217-223.
  24. Faraco G, Ladecola C. Hypertension: A harbinger of stroke and dementia. *Journal of Hypertension*. 2013;62:810-817.
  25. Jamshed Dala, Amp Dasbiswas, Immaenini Sathyamurthy, Srininase Rao Maddery, Prafulla Kerter, Sandeep Bansal, Joy Thomas, Sankar Chandra Mandal. Heart rate in hypertension: Review and expert opinions. *International Journal of Hypertension*. 2019;6. Article ID: 2087064.  
Available:<http://doi.org/10.1155.2019/2087064>
  26. Goran Davidovic, Violeta Iric-Cupic, Srdjan Milanov. Association influence of hypertension and heart rate greater than 80 beats per minute on mortality rate in patients with anterior wall STEMI. *International Journal of Clinical and Experimental Medicine*. 2013;6(5):358-366.

© 2019 Mmaju et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*  
The peer review history for this paper can be accessed here:  
<http://www.sdiarticle4.com/review-history/53073>