

**PREVALENCE OF HYPERTENSION AMONG POST-MENOPAUSAL WOMEN IN ENUGU, NIGERIA: DO AGE AND MARITAL STATUS MATTER?**

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**ABSTRACT:** *The aim of this study was to investigate the prevalence of hypertension among post-menopausal women in Enugu, Nigeria, and whether or not age and marital status are risk factors. In a cross-sectional survey, a total of 300 post-menopausal women within the age range of 45-85 years who gave their informed consent, were conveniently selected from markets, schools and homes located in Enugu metropolis. An adapted self-structured questionnaire was administered to each participant and data were generated and analyzed. Major findings revealed high prevalence of post-menopausal hypertension, especially above 50 years (67.7%), irrespective of their marital status. Results showed a statistical significant relationship ( $p < 0.05$ ) between post-menopausal hypertension and age, but not with maternal marital status. These findings suggest that age is of critical importance when predicting the onset and progress of post-menopausal hypertension. Elderly women therefore, should be given priority attention during clinical investigations and therapeutic planning for the ailment.*

**KEYWORDS:** post-menopausal hypertension, mensuration, age, marital status

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## INTRODUCTION

High blood pressure is a condition commonly seen among people of various age and gender alike. Blood pressure is the force exerted by the blood against the walls of the blood vessels and the magnitude of the force depends on the cardiac output as well as the resistance of the blood vessels

(Lawlor & Smith, 2005). When this pressure goes beyond certain limits it creates a high level of concern to humanity. Blood pressure is expressed by two measurements, the systolic and the diastolic pressures, which are the maximum and minimum pressures respectively in the arterial vessels (James *et al.*, 2013). Normal blood pressure at rest is within the range of 100-140mmHg systolic, 60-90mmHg diastolic (Musini *et al.*, 2009). The American Heart Association (AHA) categorizes blood pressure as normal when it is below 120 systolic and below 80 diastolic, pre-hypertension at the level of 120-139 systolic/80-89 diastolic, stage 1 high blood pressure when it is 140-159 systolic/90-99 diastolic, stage 2 high blood pressure at 160 or higher systolic/100 or higher diastolic and hypertension crises when blood pressure is above 180 systolic or above 110 diastolic, all measured in millimeter mercury (mmHg). Arterial hypertension can be an indicator of other problems and may have long – term adverse effects.

Menopause (also known as climacteric) is the period in women's life when menstrual periods stop permanently and the woman is no longer able to have children (Alcocer, 2008). The onset of this condition is often expected between the ages of 45 to 55 years. Its occurrence and progress have often signaled the end of childbearing for an average mother. Studies have implicated certain life variables in human, such as age, level of physical activity, behavioral dispositions and marital status of a woman in the tendency to develop hypertension.

Post-menopausal period is a stage in a woman's life immediately following the onset of menopause, until the end of her life. Both systolic and diastolic blood pressure are reported to be related to menopause independent of age, body mass index, pulse rate and hormone-replacement therapy and thus post-menopausal women had greater odds of being hypertensive than premenopausal women (Staessen *et al.*, 2001).

### **Purpose of the Study**

The purposes of the study are to:

- i. To determine the prevalence of hypertension among post-menopausal women in an urban population in Enugu, Nigeria.
- ii. To investigate whether or not maternal age and marital status are risk factors in the occurrence of the ailment.
- iii. To ascertain if there is any statistically significant relationship between post-menopausal hypertension and patients' age and/or marital status

### **Significance of the Study**

The major rationale for this research lies on the fact that there is dearth of clinical information on the existence of maternal post-menopausal hypertension in the South Eastern Nigeria, especially in Enugu. Even where some scanty information exist, factors such as age and marital status are not readily underpinned to encourage objective differential diagnosis. Results from this study will serve as useful indicators in bridging the gap in planning for healthcare services, by shading required light on the prevalence of post-menopausal hypertension, as well as its risk factors among

women in this locality. It will also guide women's health professionals on new areas of holistic assessment during women geriatric care, as well as serve as a means of contact to create awareness and clinical education on hypertension and its risk factors among post-menopausal women.

## **LITERATURE REVIEW**

Hypertension (HTN), also known as high blood pressure or arterial hypertension is a chronic medical condition in which the blood pressure in the arteries is persistently elevated (Carretero *et al.*, 2000). It is present if the resting blood pressure is persistently at or above 140/90mmHg for most adult; different numbers apply to children (James *et al.*, 2013). Hypertension usually does not cause symptoms initially but sustained elevation of blood pressure overtime is a major risk factor for hypertensive heart disease, coronary artery disease, stroke, aortic aneurysm, peripheral artery disease and chronic kidney diseases (Lewington *et al.*, 2002).

It often occurs between 45 and 55 years of age (William, 2003). Medical professionals often define menopause as having occurred when a woman has not had any vaginal bleeding for a year (Alcocer, 2008). At the physiological level, menopause happens because of a decrease in the ovaries' production of the hormones estrogen and progesterone (Alcocer, 2008). Ovulation may not occur with each cycle (Hayes & Tayer, 2012). Premenopausal women have lower blood pressure than aged-matched men; however women have higher rates of hypertension than men as they age (Martins *et al.*, 2001). These findings suggest that gender or sex hormones have a prominent role in hypertension. Determining the role of sex hormones in the pathogenesis or progression of hypertension is complex given the effect of aging on the cardiovascular system and its relationship to other powerful risk factors such as body weight and cholesterol level (Hayes & Tayer, 2012). Large randomized trials of hormone replacement therapy (HRT) have called into question the long assumed protective effect of estrogen in the risk of heart diseases (Anderson *et al.*, 2004; Manson *et al.*, 2003).

Blood pressure is typically lower in premenopausal women; however, after menopause, the prevalence of hypertension in post-menopausal women becomes higher (O'Brien *et al.*, 2007). Hypertension is a major risk factor for cardiovascular disease in women and men, but cardiovascular disease is the leading cause of death in women (Rodriguez *et al.*, 2012). Furthermore, there is evidence that blood pressure may not be as well controlled in women as in men, despite the fact that most women adhere better to their therapeutic regimens and medications than men, and have their blood pressures measured more frequently than men (Marik *et al.*, 2007). Menopause is associated with a reduction in estradiol and a decrease in the estrogen-testosterone ratio (Chobanian *et al.*, 2003). This results in endothelial dysfunction and increases in body weight (body mass index and type II diabetes, which causes an increase in sympathetic activation, commonly experienced by post-menopausal women. These physiological actions contribute to increase in renal vasoconstriction that will cause hypertension. Sometimes it can be an acute problem, for example hypertensive emergency (Taddei, 2009). Levels of arterial pressure put

mechanical stress on the arterial walls. Higher pressures increase heart workload and progression of unhealthy tissue growth (atheroma) that develops within the walls of arteries (Lionakis et al., 2012). The higher the pressure, the more stress that is present and the more atheroma tend to progress and the heart muscle tends to thicken, enlarge and become weaker over time (Eunice, 2013).

Persistent hypertension is one of the risk factors for strokes, heart attacks, heart failure and arterial aneurysms, and is the leading cause of chronic kidney failure. Even moderate elevation of arterial pressure leads to shortened life expectancy. At severely high pressures, mean arterial pressures 50% or more above average, a person can expect to live no more than a few years unless appropriately treated. In the past, most attention was paid to diastolic pressure; but nowadays it is recognized that both high systolic pressure and high pulse pressure (the numerical difference between systolic and diastolic pressures) are also risk factors. In some cases, it appears that a decrease in excessive diastolic pressure can actually increase risk, due probably to the increased difference between systolic and diastolic pressures (see the article on pulse pressure). If systolic blood pressure is elevated (>140) with a normal diastolic blood pressure (<90), it is called "isolated systolic hypertension" and may present a health concern (Retrieved from Clinical Management of Isolated Systolic hypertension).

Longitudinal and cross-sectional studies reported conflicting results concerning the role of menopause in the pathogenesis of hypertension and thus, the motivation for this study. Paucity of data and literature on the prevalence of hypertension among postmenopausal women in Nigeria also stimulated interest for this research work.

## **METHODOLOGY**

### **Study Design**

The study is a cross-sectional observational research design. Structured questionnaires were distributed and the data obtained at the point of distribution. The subjects were not followed up for additional study.

### **Data collection procedure**

The subjects for this study included 300 postmenopausal women who reside in Enugu metropolis and are within the age ranges of 45-85 years. Self-structured questionnaire adapted from menopause health questionnaire of the North American Menopause Society (NAMS) was administered to each participant who also met the inclusion criteria of being able to read and write or at least can respond in English and/or Igbo languages. The questionnaire was structured with closed and open ended questions, to obtain required information from participants such as age, marital status and occupation, as well as general questions relating to prevalence of postmenopausal hypertension. Measurement instruments were used to measure height, weight, hip

circumference, waist circumference, percentage body fat, percentage body muscle, and percentage body bone and percentage body water.

The aim, purpose and relevance of this study were explained to women who had attained menopause in their various locations including schools, churches, residents and markets and the informed consent form was given to the subjects that were willing to participate in the study. The respondents were assured that the information obtained will be strictly used for the research purpose. Assistance was rendered to the participants who were not able to fill the questionnaire independently by the researchers and assistants. The questionnaires were completed and returned to the researchers and assistants. Both subjective and objective techniques of data collection were adopted. Required data were thus obtained from participants' responses to the questionnaire and measurement values

An arm digital sphygmomanometer with cotton cuff and zipper case, model number: RCC12B and made in China, was used to measure the systolic and diastolic blood pressure of participants. Other information regarding a participant's age and marital status were extracted from the structured questionnaire.

### **Data Analysis**

Descriptive statistics of frequency distribution and percentage was used to represent the prevalence distribution while inferential statistics of Chi-square was used to test for correlation. SPSS statistical software version 21 was used and  $\alpha$  -value was set at 0.05.

## **RESULTS/FINDINGS**

### **Demographic Characteristics of Participants**

The demographic disposition of the three hundred participants were considered. Two variables of age and marital status were used to consider blood pressure status of participants in terms of systolic and diastolic levels. Hence, they were grouped into 7 age ranges, as well as three categories of marital status- married, single and widowed. Age groupings were considered in terms of systolic and diastolic blood pressure characteristics, as distributed in tables 1 and 2, while marital status dispositions were captured in tables 3 and 4.

**Table 1: Descriptive comparison of hypertensive status of subjects according to age group (Systolic hypertension)**

Age	Non-hypertensive N (%)	Hypertensive N (%)	Total N
45-49	51(55.4)	41(44.6)	92
50-54	20(32.3)	42(67.7)	62
55-59	23(32.9)	47(67.1)	70
60-64	17(53.1)	15(46.9)	32
65-69	12(42.9)	16(57.1)	28
70-74	5(50.0)	5(50)	10
75-85	0(0)	6(100)	6
	128(42.7)	172(57.3)	300

**Table 2: Descriptive comparison of hypertensive status of subjects according to age group (Diastolic hypertension)**

Age	Non-hypertensive N (%)	Hypertensive N (%)	Total N
45-49	50(54.3)	42(45.7)	92
50-54	20(32.3)	42(67.7)	62
55-59	21(30.0)	49(70.0)	70
60-64	18(56.3)	14(43.8)	32
65-69	11(39.3)	17(60.7)	28
70-74	4(40.0)	6(60.0)	10
75-85	1(16.7)	5(83.3)	6
	125(41.7)	175(58.3)	300

Tables 1 and 2 summarize findings of hypertensive status of participants as relates to various age groups. Results indicate that hypertensive groups predominates non-hypertensive groups with mean values of 57.3% and 42.7% respectively for systolic level. This relationship is also true for diastolic level which reveals hypertensive group 58.3% and non-hypertensive 41.7% of all participants.

When marital status was considered, widowed participants with hypertension scored highest level, reaching 60.9% when compared to other status, single 53.8% and currently married 5.16%. The overall comparative results in this case also show that the number of systolic hypertensive participants were more than the non-hypertensive group, scoring respectively 172(57.3%) and 128(42.7%), table 3. Table 4 also reveals increase in the number of participants with diastolic hypertension which stands at 175(58.3%) against non-hypertension at 125(41.7%).

When investigated whether age and marital status are risk factors for post-menopausal hypertension statistics indicate significant relationship between systolic hypertension and the age at marriage, during first birth and during last menstruation, set at  $p < 0.05$ , table 5. There was however no significant relationship between systolic hypertension and current age and age during last birth. There is also a significant association between diastolic hypertension and current age, age when married, age during first birth and age during last birth, while there is no significant association between diastolic hypertension and age during last menstruation ( $p > 0.05$ ).

Although there was relativity in the pattern of outcome of hypertension and non-hypertension scores among single, married and widowed participants, there was an overall marginal percentage difference between the two indices at different categories of marital status and within the two blood pressure variables. Widowed participants appear to record higher percentage of hypertension (61.5%/64.1%- systolic/diastolic) than their counterparts in the other two categories. This discrimination could be attributed to added family pressures resulting from single parenthood.

**Table 3: Descriptive comparison of hypertensive status of subjects according to marital status (Systolic hypertension)**

Marital status	Non-hypertension N (%)	Hypertension N (%)	Total N
Single	6(46.2)	7(53.8)	13
Married	97(43.9)	124(56.1)	221
Widowed	25(39.1)	40(61.5)	65
	128(42.7)	172(57.3)	300

**Table 4: Descriptive comparison of hypertensive status of subjects according to marital status (Diastolic hypertension)**

<b>Marital status</b>	<b>Non-hypertension N (%)</b>	<b>Hypertension N (%)</b>	<b>Total N</b>
Single	7(53.8)	6(46.2)	13
Married	94(42.5)	127(57.5)	221
Widowed	24(35.9)	41(64.1)	65
	125(41.7)	175(58.3)	300

**Table 5: Relationship between age and Systolic/Diastolic Blood Pressure Levels**

<b>Proposed factors</b>	<b>Chi square value</b>	<b>df</b>	<b>p. value</b>
Current Age $\chi^2$ Systolic B.P	44.514	33	0.087
Current Age $\chi^2$ Diastolic B.P	51.319	33	0.022*
Age when married $\chi^2$ Systolic B.P	58.368	31	0.002*
Age when married $\chi^2$ Diastolic B.P	54.889	31	0.005*
Age during first birth $\chi^2$ Systolic B.P	42.905	28	0.036*
Age during first birth $\chi^2$ Diastolic B.P	54.052	28	0.002*
Age during last birth $\chi^2$ Systolic B.P	44.267	32	0.073
Age during last birth $\chi^2$ Diastolic B.P	62.408	32	0.001*
Age during last menstruation $\chi^2$ Systolic B.P	40.991	25	0.023*
Age during last menstruation $\chi^2$ Diastolic B.P	35.566	25	0.078

\* Statistical significance

B.P – Blood pressure



## **DISCUSSION**

Findings from tables 1 - 5 showed high prevalence of both systolic and diastolic hypertension in post-menopausal women. This high rate of hypertension can be attributed to aging process such as ages at marriage, during first birth and during last menstruation. Notable features of post-menopausal hypertension were also manifest at current age after the onset of menopause. This result seems to be similar with the outcome of the work done by Ying Zhou *et al.*, (2015), during which they discovered that hypertension was highly prevalent among women over 35yrs of age in rural China, found after adjusting for confounding variables. Post-menopausal status was an independent risk factor for hypertension thus, elderly women have high prevalence of hypertension. Ying Zhou *et al.*, (2015) argued that the rates of prevalence of hypertension, hypercholesterolemia and diabetes mellitus were significantly higher in all the post-menopausal groups. Outcome of this study also implicated age as a risk factor for this ailment. This means that older women are more vulnerable to post-menopausal hypertension than their younger counterparts, irrespective of their marital status. Wiinber *et al.*, (1995) in their work established that women aged <55 years tend to have lower prevalence rates of hypertension, women aged 55 to 74 years have similar rates and those aged >75years have higher rates.

When correlation between systolic/diastolic hypertension and the different maternal ages was considered, findings in table 5 showed that there was no significant relationship between systolic BP and current age as well as age during last birth. This is however not the same with diastolic BP which shows significant relationship with age when married age, during first birth and systolic/diastolic BP. These outcomes seem to agree with the report of Wiinber *et al.*, (1995)) which states that blood pressures increases in many women after menopause and that it is one of the risk factors for menopausal hypertension. In addition they also included a report which states that in aging women; systolic and diastolic blood pressures increase, although in later years, the diastolic pressure plateaus, or even declines. Thus, the prevalence of hypertension and cardiovascular disease risk increases, regardless of ethnic origin. This assertion also aligns with results of researches conducted by Ong *et al.*, (2008) and Burt *et al.*, (1995) which showed a significant association between age and post-menopausal hypertension. Parvatha and Neelembikai (2013) discovered in their work that blood pressure is elevated among post-menopausal women when compared with pre-menopausal women ( $P<0.01$ ).

On the other hand, several studies have indicated that behavioral modifications such as maintaining an improved regular physical activity schedule are recommended as first-line or adjunctive therapy for hypertension (Maas and Frank, 2009; Van-Nikerk *et al.*, 2003). Studies by Staffileno *et al.*, (2001) showed that hypertensive; post-menopausal women who engage in intermittent, moderate-intensity physical activity experience a reduction in blood pressure. These assertions create the need for studies on post-menopausal hypertension, using physical activity as an index.

### **Implications to research and Practice**

Clinical studies based on post-menopausal hypertension have not gained popularity in Nigeria. This study and its findings have the following research and practice implications:

- i. The findings are relevant as they provide strong platform for sound and objective clinical decisions for healthcare professionals when conducting assessment and management of post-menopausal hypertension.
- ii. Patients presented with such ailment will find the findings useful, such that unnecessary phobia for untoward manifestations may be generally curtailed.
- iii. Clinicians and elderly women through the results will find a common ground when strategizing for healthcare solutions for the ailment.
- iv. Knowledge of risk factors and other clinical indices as revealed in this work will go a long way in addressing challenges associated with differential diagnosis of maternal hypertension.

### **CONCLUSION**

The major outcome from this study shows that the prevalence of hypertension in women is high after the onset of menopause and a lot of factors such as age and marital status were reported to predispose women to this condition. Paucity of information on the prevalence and predisposing factors of postmenopausal hypertension are common place among women in the Eastern Nigeria. This piece of work therefore serves to further elucidate the existence of this ailment, as well as implicate age as risk factor. Elderly women are more vulnerable.

Based on the findings from this work, it can be concluded that there is high prevalence of hypertension among post-menopausal women in Enugu metropolis, especially in those above 50 years of age. There is a significant relationship between current age, age at marriage, age during first birth, age during last birth, as well as age during last menstruation and post-menopausal hypertension. There is however no significant relationship between the ailment and marital status, such as single, married or widowed.

Awareness program should be organized to enlighten the public especially women both within urban and rural areas about post-menopausal hypertensive, the predisposing factors, signs, symptom, preventive and treatment measures available. Clinicians should pay more attention to women within 50 years and above to enable early detection and management of the condition. Women who have attained menopause should seek early medical counseling. Causes and factors predisposing women to postmenopausal hypertension should be discussed with women even before they attain the age of menopause. There should be a post-menopausal care program aimed at managing conditions of menopause and other related maternal ailments. There is the need for further researches to be carried out in this direction, engaging higher sample sizes and investigating other risk factors of post-menopausal hypertension.

### **Future Research**

This study is by no means exhaustive. Most of the respondents were not able to fill the questionnaires completely, thus, reducing the number of available questionnaires. There was also limited numbers of research assistants during the period of data collection, making follow-ups quite difficult. Paucity of fund also contributed to some of the inadequacies and challenges experienced in this research, as it was self-sponsored. Appropriate note was taken that the sample size utilized in the study could have been greater but for reluctance on the part of prospective participants to make timely responses, and this obviously may have affected the outcome of this study.

Both independent and dependent variables in this work require further scrutiny to ensure better dependability of findings in future researches. Further randomized clinical studies, utilizing additional outcome measures and considering other variables such as maternal routine physical activities, hormonal involvement and maternal consumption of alcohol may give additional and more accurate information.

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