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Original Research Article

Prevalence of Hypertension and Its Association with Obesity among Women Attending Valley View University Hospital, Accra

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ABSTRACT

Background: Hypertension has consistently ranked among the top ten causes of outpatient morbidity accounting for 3% to 5% of all new outpatient diseases. Population-based studies estimate the prevalence of hypertension in Ghana at 19% to 48%.
Objective: To determine the prevalence of hypertension and its association with obesity among women attending Valley View University Hospital, Accra.
Methodology: The study was a hospital based cross-sectional study conducted at outpatient department of Valley View University Hospital in Accra, Ghana, where 200women aged 25 to 74years visiting the facility were recruited to participate in the study. Data were analyzed using the SPSS programme IBM version 20. Chi-square was used to investigate the association between independent variables and prevalence of hypertension. The data were further analyzed using binary logistic regression methods to evaluate possible risk factors associated with hypertension. Odd ratio was reported to establish the risk of hypertension and 95% confidence interval were estimated. A $p<0.05$ was considered as statistically significance.
Results: The findings revealed that 77out of 200 participants were hypertensive, giving the overall prevalence of 38.5%. Forty (20.0%) of the participants were previously diagnosed of hypertension.
Conclusion: The study established that the prevalence of hypertension was high and its associated risk factors included age, obesity and family history of hypertension. Preventive efforts targeting lifestyle changes at community level to curtail these risk factors at population and individual level is urgently required.
Keywords: Body Mass Index, Hypertension, Obesity, Parity.

INTRODUCTION

Hypertension has consistently ranked among the top ten causes of outpatient morbidity accounting for 3% to 5% of all new outpatient diseases (MOH, 2012). In the Greater Accra Region, hypertension ranked as the second commonest cause of outpatient morbidity in 2008. Generally, the proportion of new outpatient diseases due to hypertension is highest in the Region followed by, Eastern and Volta Regions and lowest in the three Northern Regions respectively (MOH, 2012). Population-based studies estimate the prevalence of hypertension at 19% to 48% (Bosu, 2010; Opare *et al*., 2014; Addo *et al.*, 2012).

Hypertension is considered as having a *blood pressure* reading of more than *140/90 mmHg* over a number of weeks

(Moreira *et al*., 2014). Along with major cardiovascular risk factors, hypertension groups with obesity, dyslipidemia, and glucose intolerance, which in turn link with unrestrained blood pressure (BP), further increasing total risk (Kaur, 2014)**.** Women often have compound risk factors, central obesity, elevated total cholesterol, high density lipoprotein, and higher systolic blood pressure, which independently predict cardiovascular events (Geraci, 2013)

Secondary hypertension and problems related to menopause add to the difficulties of treating hypertensive women; as a result, it is imperative to appreciate sex-specific factors that influence risk and blood pressure control in hypertensive women and to apply this understanding to treatment and prevention (Abramson & Melvin, 2014; Geraci et al., 2013)**.**

The worldwide prevalence of obesity has nearly double between 1980 and 2014 (Boulangé, Neves, Chilloux, Nicholson, & Dumas, 2016). Overweight and obesity are associated to more deaths worldwide than underweight (World Health Organization (WHO), 2016). Among adults, raised Body Mass Index (BMI) is a major risk factor for noncommunicable disease. The risk for these (Davies, Yudkin, & Atun, 2016) non-communicable diseases increases, with rises in BMI (Lee *et al*., 2014). Increasing body mass index and abnormalities in glucose metabolism resulting from estrogen deficiency at menopause may contribute to the increase of the metabolic syndrome in older women, imparting a higher risk of cardiovascular diseases and hypertension in this population (Nuzzo, 2010;Lizcano & Guzmán, 2014).

The interaction of menopause, obesity, and salt sensitivity on the development (Geraci et al., 2013) of hypertension in women has been investigated extensively (Erdine, Arslan, & Olszanecka, 2012).Therefore, an effective therapeutic approach in these patients should spotlight on treating co morbid conditions and risk factors to reduce total cardiovascular risk. Given the complex pathophysiology of hypertension in menopause, lifestyle modification may play a critical role in effective blood pressure and cardiovascular risk reduction (Buttar& Ravi, 2005; Jiang *et al.*, 2013; Geraci et al., 2013: Kaur, 2014).

According to WHO, the obesity levels in Ghana increased from 10% in 1993 to 25.3% in 2010 (WHO, 2014; Agyei-Mensah & de-Graft Aikins, 2010). The prevalence of obesity has continued tirelessly in Accra in Ghana. Several studies carried out in Ghana have documented that prevalence of obesity is highest in Accra (Wang *et al*., 2016; Dake, Tawiah, & Badasu, 2010; Biritwum, Gyapong, & Mensah, 2005; Amoah, 2003b).

Cardiovascular disease is the most frequent cause of death (Sitar-tăut, Zdrenghea, & Sitar-tăut, 2009) in women in Ghana, and hypertension is a major cause of cardiovascular mortality. The occurrence of hypertension in women is progressively increasing, paralleling the eruptions of obesity and diabetes (Abramson & Melvin, 2014). Blood pressure control velocities among women are sub optimal, even when secondary causes are identified and treated (Geraci & Geraci , 2013). Some information differentiating hypertensive women to age-matched men propose benefits to sex-specific strategies, but additional study is needed to determine best treatments for women throughout their life (Abramson *et al*., 2014; Greiten *et al*., 2014; Harvey, Coffman, & Miller, 2015).

The research has the following objectives:

1. To determine the prevalence of hypertension and its association with obesity among women attending Valley View University Hospital.
2. To determine age, parity and family history of hypertension associated with prevalence of hypertension among the study population.

METHODOLOGY

Study Design

A cross-sectional study was conducted at Valley View University Hospital between February and April, 2017.

The present study was approved by the Management of the hospital to determine prevalence of hypertension and its association with obesity among women attending the hospital in Accra, Ghana.

Study Population

The study population included non-pregnant women aged 25-74 years attending out-patient Department clinic in Valley View University hospital were eligible to participate in the study. Subjects were informed and their consent was sought.

Sample Size and Sampling Method

The sample size was calculated using (Fisher, 1978):

$N= Z^2 * P (1 – P) / d^2$ where N = sample size

Z = score for 95% Confidence Interval which is 1.96

P = prevalence of hypertension (proportion of people with hypertension presume to be 14% or higher). q=1-p (proportion of people without hypertension) d = tolerable error set at 5%. N =185.01 making 8% allowances for losses, it was approximated to 200.

Sampling Method

A total of 758 women age 25 and above attended outpatient clinic three month prior to the study, resulting in an average attends rate of 63 women per week. The study was designed to be performed over 12 weeks during which estimated 760 women were expected to attend outpatient clinic from February to April 2017. The simple random sampling (lottery) method was used to select the first study participant and the remaining numbers of women were selected through systematic sampling, at fixed intervals (k = sampling interval: 760/200= 4) of every fourth number on the sampling frame to make up to the required 16 women per week. Subsequent participant were recruited until 200 participants were reached. Females aged 25 years and above were considered eligible for the study regardless of their status of blood pressure, while those aged below 25years or were pregnant were excluded.

Data Collection and Procedures

The method of data collection comprised self–administered questionnaire and physical assessment. The questionnaire included age, level of education, body mass index, parity and family history of hypertension.

Anthropometric Measurements

Body weight was measured with bare footed to the nearest 0.1kg using bathroom scale. It was validated with standard weight and corrected for zero inaccuracy. Height was measured without shoes to the nearest 0.5cm using stadiometer. The body mass index (BMI) was calculated as weight in kilograms divided by the square (Helal, Fick-Brosnahan, Reed-Gitomer & Schrier, 2012) of the height in meters. BMI of participants were categorized as underweight (BMI<18.5), normal weight (BMI <25kg/m^2), overweight (≥25 to 29.9kg/m^2), and obese (BMI ≥30kg/m^2).

Blood Pressure Measurements

The blood pressure was measured after the participants had been seated and rested for 5 minutes using sphygmomanometer and stethoscope. Hypertension (raised blood pressure) defined as systolic BP ≥140mmHg and/or diastolic BP ≥90mmHg. Average of two systolic and diastolic blood pressure measurements were calculated and were used as variables in the analysis

Statistical Analysis

Data were analyzed using the SPSS programme IBM version 20. Descriptive statistics were calculated for all numerical parameter: height, weight, body mass index, systolic blood pressure, diastolic blood pressure, and for non- numeric parameters: age groups, level of education, obesity, parity, and family history of hypertension. Continuous variables are stated in mean standard deviation. Cross tabulation was done to determine percentages. Chi-square was used to investigate the association between independent variables and prevalence of hypertension. The data were further analyzed using binary logistic regression methods to evaluate possible risk

factors associated with hypertension. Odd ratio (OR) was reported to establish the risk of hypertension and 95% confidence interval (C.I.) were estimated. A $p<0.05$ was considered as statistically significance.

RESULT

A total of 200 adult females participated in the study. The results indicated that the Mean± SD age was 50.38±13.57 years, height was 160.41±5.25cm, weight 74.73±16.90kg, BMI was 29.06±6.34Kg/$m^{2,}$ systolic blood pressure (SBP) was 127.85±21.07 mmHg and diastolic pressure (DPB) was 80.75±13.89mmHg as shown in table1

Table 1: Physical measurements of the study population (N=200)

Variables	Minimum	Maximum	Mean± SD
Age in Years	25.0	74.00	50.38±13.57
Height(Cm)	145.0	175.00	160.41±5.25
Weight(Kg)	39.0	115.00	74.73±16.90
BMI(Kg/m^2)	16.4	44.3	29.06±6.34
SBP(mmHg)	100.0	210.00	127.85±21.07
DBP(mmHg)	50.0	120.00	80.75±13.89

Distribution of Blood Pressure

The Table 2 represents the distribution of mean systolic and diastolic blood pressure by age group among participants. Results indicated that the overall mean systolic blood pressure was (mean± SD) 127.85±21.07mmHg with mean diastolic pressure of 80.75±13.89mmHg. Both mean systolic blood pressure and diastolic blood pressure increased gradually with age as shown in Table 2.

Table 2: Distribution of mean systolic and diastolic blood pressure by age group among participants

Age Group	Mean SBP ± SD	Mean DBP ± SD
25-34	116.3636±11.67748	72.4242±11.67748
35-44	124.7222±16.81600	79.7222±12.30241
45-54	125.9184±18.92071	81.2245±13.93925
55-64	131.7021±25.22241	82.7660±12.80321
65-74	139.4286±22.61479	86.2857±16.81836
Total	127.8500±21.07363	80.7500±13.88892

Table 3 presents results on the distribution of hypertension status among the study participants. Results indicated that out of 200 study participants, 77 were classified as being hypertensive, giving a prevalence of hypertension of 38.5%. Forty (20%) of the subject were previously diagnosed of hypertension (aware of hypertension status) as compare to 160 (80.0%) participants who were not diagnosed or unaware of their hypertension status.

Table 3: Distribution of hypertension status among the study population

Variables	Normal	Hypertension	No. of Subject
Undiagnosed	97(60.6%)	63(39.4%)	160(80.0%)
Diagnosed	26(65.0%)	14(35.0%)	40(20.0%)
Overall	123(61.5%)	77(38.5%)	200(100%)

Table 4: Prevalence of hypertension according to age, education, BMI, parity and family history of hypertension (N=200)

Variables	Normal n (%)	HTN n (%)	Total n (%)
Age Chi-Square= 20.162, P<0.000			
25-34	30(90.9)	3(9.1)	33(16.5)
35-44	24(66.7)	12(33.3)	36(18.0)
45-54	29(59.2)	20(40.8)	49(24.5)
55-64	26(55.3)	21(44.7)	47(23.5)
65-74	14(40.0)	21(60.0)	35(17.5)
Level of Education Chi-Square= 0.196, P=0.978			
Primary & Below	78(60.5%)	51(39.5)	129(64.5)
JHS	22(62.9)	13(37.1)	35(17.5)
SHS	13(65.0)	7(35.0)	20(10.0)
Tertiary	10(62.5)	6(37.5)	16(8.0)
BMI Chi-Square= 12.670, P<0.005			
Underweight	6(85.7)	1(14.3)	7(3.5)
Normal	40(76.9)	12(23.1)	52(26.0)
Overweight	32(64.0)	18(36.0)	50(25.0)
Obese	45(49.5)	46(50.5)	91(45.5)
Parity Chi-Square =13.867, p<0.016			
No Child	14(87.5)	2(12.5)	16(8.0)
1 Child	38(74.5)	13(25.5)	51(25.5)
2 Children	25(61.0)	16(39.0)	41(20.5)
3 Children	18(52.9)	16(47.1)	34(17.0)
4 Children	16(51.6)	15(48.4)	31(15.5)
≥5 children	12(44.4)	15(55.6)	27(13.5)
Family History of HTNChi-Square =9.009, P<0.003			
No	65(73.0)	24(27.)	89(44.5)
Yes	58(52.3)	53(47.7)	111(55.5)
HTN=Hypertension, BMI-body mass index			

The Table 4 presents results on the prevalence of hypertension according to age, education, body mass index, parity and family history of hypertension among the study participants. Results indicated that hypertension, 21(60%) was higher among the aged 65-74years**.** The majority, 129(64.5%) had no formal education and 51(39.5%) were hypertensive as compare to the 16(8.0%) reported to have attained tertiary education and 6(37.5%) were hypertensive. Ninety-one (45.5%) of participants were obese and 46(50.5%) were hypertensive. Women who had 5 or more children reported higher percentage (55.6%)

of hypertension history than their counterparts who had 4 children (48.4%), 3 children (47.1%), 2 children (39.0%) and 1 child (25.5%) and no child (12.5%). With regard to family history of hypertension, the highest percentages were reported among the participants whose blood relation have hypertension (47.7%) and no family history of hypertension (27.0%)

Inferential Statistics

As seen in Table 4, significant association was found between prevalence of hypertension and age, body mass index, parity and family history of hypertension (p<0.000,P<0.005, p<0.016, P<0.003) respectively. The parameter level of education presented no significant association (P=0.978).

Risk Factor Analysis for Hypertension

The results of binary logistic regression analysis, including odd ratio (OR) for age in years, body mass index, parity and family history of hypertension are presented in Table 5.

Table 5: Association between prevalence hypertension and risk factors by binary logistic regression analysis

Variables	OR	95% C.l	P -value
Age in years(<45, ≥45)	3.49	1.72-7.09	0.001
BMI,kg/m^2(<30,≥30)	2.58	1.376-4.84	0.003
Parity **(**<3, ≥3**)**	1.47	0.61-3.53	0.395
FH of HTN (no, yes)	2.16	1.14-4.20	0.019
FH- Family history , HTN=Hypertension, BMI-body mass index			

Table 5 shows that participants who were 45years and above were 3.49 times more likely to be hypertensive than those who were below the age of 45 years. Obese participants were 2.58 times more likely to be hypertensive than those who were not obese. Participants who had 3 children and above were 1.47 times more likely to be hypertensive than those who did not. Participants with an immediate family member with hypertension were 2.16 times more likely to be hypertensive than those who did not.

DISCUSSION

Hypertension

The prevalence of hypertension was 38.5% and it was more among undiagnosed 39.4% as compare to diagnosed 35.0%. These figures are higher compared with the 21.5 % prevalence among the female general population of Ghana (WHO, 2014). Although there was a high percentage of a diagnosed hypertensive participant, the majority 26(65.0%) had their blood pressure well controlled.

Age and Hypertension

Statistical significance association between age and hypertension was found (p <0.001). Association with age and hypertension was seen in most of the studies (Syer *et al*., 2010; Marwiro, 2010) by different authors. This study also demonstrates that the prevalence of hypertension increased with age which is consistent with the global related rise of blood pressure. Blood pressure rises with age for most people from youth through middle age (Galambos, Fang, Krahn, Johnson, & Lachman, 2015).

As a consequence, by middle age, population average systolic blood pressure are above optimal levels (below 120/80 mmHg). Aging has become worldwide social challenge. However, aging itself is not a disease but a period in the life of an individual. Effort of exercise and good nutrition can decrease prevalence of hypertension with age and contribute to healthy active expectancy.

Obesity and Hypertension

A statistical significance on the association between obesity and hypertension was found (P<0.003). In this study, very few participants were in the group of healthy BMI. Only 41(27.3%) of the participants presented with a healthy BMI, 5(3.3%) were reported underweight, whereas 39(26.0%) were reported to be overweight and 65(43.3%) as obese. In this and several other studies, it was found that increasing body weight was a risk factor for development of hypertension. (Doğan e*t al*., 2012; Syer *et al*., 2010; Ogah, *et al*., 2012). The relation of hypertension and obesity has been known for many years (Doğan *et al*., 2012; Erem, Hacıhasanoğlu , Kocak, Değer, & Topbaş, 2009).

The greater the body mass, the more blood is needed to supply oxygen and nutrients to the muscle and other tissues (Mondzinger, 2012). The Pooled prevalence of overweight and obesity among the participants is 69.3% which is high. This points out an increased tendency of worsening future trends of obesity in area with its relate problems, making it a significant public health issue in the study subjects. Hence exercising and weight loss can reduce blood pressure and help to reduce the risk for heart attack and stroke.

Parity and Hypertension

Statistical significance association between parity and hypertension was not found ($p<0.395$). Few studies have reported results of the association between parity and hypertension growth over the years, particularly among Black women. In the present study, the prevalence of hypertension increased with the number of births as reported by various studies (Doğan *et al*., 2012; Erem *et al*.,2009). One potential risk factor that has been understudied is the effect that the number of pregnancies and birth has on blood pressure readings (Guan, Wu, & Gong, 2013) of women later in life**.** Pregnancy and child bearing are timed physiological conditions (Spence, 2008).

There is evidence that these conditions may have a long-term impact on the health of the women (Braveman & Gottlieb, 2014). According to a systematic review of epidemiologic evidence, it has been shown that having a high number of reproductive events increases women's risk of developing cardiovascular disease (Akter *et al*.,2013; Wu *et al*., 2015). Therefore, striking alterations in both cardiovascular function and volume homeostasis occur during normal pregnancy; knowledge of these normal adaptations is requisite to the early detection and optimal management of pre-existing or new-onset disease (Lindheimer, Taler, & Cunningham, 2009; Marshall, Sandra, & Cunningham, 2008).

Family History of Hypertension

Statistical significance association between family history of hypertension and hypertension was found ($p<0.019$).Several studies have established family history of hypertension as associated with an increase in the prevalence and incidence of hypertension (Gyamfi, 2010). It is a recognized risk factor for CVD which represents genetic, environmental and behavioural elements, in addition to the interaction among them (Acheampong., 2011). This stresses the importance of family and genetic factors in susceptibility to hypertension and the need for regular screening in this high-risk group (Marwiro, 2010).

A family history of hypertension is a risk factor for one developing hypertension. Blood connections tend to have several of the same genes that can influence a person to have high blood pressure, heart disease, or stroke. Relatives may also carve up some of the same behaviors such as diet, physical exercise, and smoking that can influence the risk. Individuals with close family members, who either have hypertension or have suffered strokes or heart attacks at a young age, should be subjected to regular blood pressure monitoring (Mondzinger, 2012).

Study Limitations

Nevertheless, the study delivers dependable and valid evidence; the study may have some limitations.

1. The fact that participants were present at hospital at the time of the visit and were among the first four to be encountered.
2. Blood pressure was established on the mean of the two measurements at a single visit which could have resulted the high prevalence of hypertension among the participants

CONCLUSION

The study established high prevalence of hypertension and its associated risk factors included age, obesity and family history of hypertension. This study also demonstrates that the prevalence of hypertension increased with parity. Therefore, women with a very high risk of

developing hypertension like high systolic blood pressure, marked obesity should undertake blood pressure screening regularly for early detection and prompt treatment. Preventive efforts aimed at lifestyle changes, at community level, to curtail these risk factors at population and individual level is urgently required.

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