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Dietary Habits, Body Mass Index Status and Blood Pressure of Older adults in the Tano North District of Ghana

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Abstract

Background: Hypertension is a contributing factor of cardiovascular diseases, causing morbidity and mortality around the globe. Poor dietary habit is among the multifactorial cause of hypertension, leading to disease complications. This study investigated dietary habits, anthropometric status and blood pressure levels of older adults at Tano North District in the Bone East Region of Ghana.

Results: Majority of the older adults responded to consuming sugar-sweetened beverages (74.7%) and ate outside home (80.3%), but, less numbers daily or weekly engaged in these practices. The prevalence of obesity, abdominal obesity and high blood pressure among older adults was 10.1%, 34.8% and 46.0% respectively. When age and gender of older adults were adjusted in the correlation analysis model, there was a weak, positive correlation between body mass index and systolic (r=0.240, p=0.001) and diastolic blood pressure (r=0.200, p=0.005). Divorced older adults, participants who did not take sugar sweetened drink (OR: 0.5 95% CI: 0.3-1.0, p=0.050), ate outside home 2-4 times per week (OR: 0.4 95% CI: 0.2-0.9, p=0.033) and chose meals based on health (OR: 0.5 95% CI: 0.2-0.9, p=0.036) were more likely to have normal blood pressure level.

Conclusion: Majority of the older adults in this study were classified as overweight (30.9%) and obese (11.2%) and, 46.0% had uncontrolled blood pressure and poor dietary habit, which increase their risk of hypertension complications and other chronic diseases. There is the need for comprehensive age-appropriate nutrition education among older adults in the communities to develop good dietary habits, so as to manage the condition appropriately and reduce the burden of hypertension complications.

Keywords: Nutrition; Hypertension; Older adults; Anthropometry

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Introduction

Good nutrition is a modifiable risk factor for some non-communicable disease prevention, and studies have consistently shown a direct relationship between diet and health status including that of older adults [1]. Diet is a complex entity, and studies have focused on dietary behaviours as an index to measure the impact of diet on health outcomes of selected populations [2]. Nutritional research has largely focused on the effects food components such as fruits and vegetables, whole grains, saturated fatty acids, trans-fatty acids, polyunsaturated fatty acids, omega-3 fatty acids on disease outcomes [3]. However, given that these foods are not consumed in isolation, there has been a gradual movement away from nutrient-based approaches to one that considers dietary behaviour and its associated complexities in relation to non-communicable diseases such as hypertension. Hypertension has become a major contributor to the burden of cardiovascular related morbidity and mortality in the world [4]. Globally, hypertension is defined as systolic blood pressure greater than or equal to 140 mmHg or diastolic blood pressure greater than or equal to 90 mmHg [5]. On the basis of the current scientific evidence, a healthy dietary pattern has the potential of helping an individual to achieve and maintain a healthy anthropometric measurement whiles minimizing the risk of developing Cardio Vascular Diseases (CVDs). According to World Health Organization report, an estimated 1.13 billion people have been diagnosed of hypertension and two-third of these people live in low- and middle-income countries [6]. Report reveals that, of the 17 million cardiovascular related deaths annually, hypertension alone accounts for about 9.4 million of the death tolls and responsible for 7% of total Disability Adjusted Life Years (DALYs) [7].

Over the past four decades, there has been sharp increase in prevalence of hypertension among Ghanaian population, which has significantly contributed to stroke morbidity and mortality [8]. Data from 2014 Ghana Demographic Health Survey which sampled 13,247 participants between 15 and 49 years estimated that, about 13% of the Ghanaian adult population (12.1% for males and 13.4% for females) are living with hypertension [9]. Hypertension could be high in vulnerable population such as the adolescents and this in part is due to the increasing prevalence of childhood obesity as well as growing awareness of this disease, as well elderly people. With current report showing high prevalence of hypertension (9.1%) among 909 adolescents in Kumasi, there is a need to update the baseline data on prevalence of hypertension among elderly people in Ghanaian communities with less health care facilities.

Studies have been conducted towards the reduction and/or stabilization of the incidence of hypertension in most developed countries through various lifestyle interventions [10]. However, there is dearth of information regarding low and middle-income countries with respect to interventions in mitigating hypertension cases [11]. In Ghana for instance, a review on the prevalence of hypertension among the elderly reported about 19.3% and 54.6% in rural and urban settings, respectively [12]. The continuous threat hypertension and other cardiovascular related diseases pose worldwide, especially among the elderly population calls for public health attention and further research to unravel its associated factors amidst those that have been proposed. This research focused on investigating dietary habits, anthropometric status and blood pressure levels of older adults at Tano north district of Ghana.

Methods

Methodology

Study design and population: The study employed a cross-sectional study design. The study population was adults above 55 years of age within the Tano North District in the Brong Ahafo Region of Ghana. It has a total population of 91,664. It is bounded to the north east by Ahafo Ano South district, Asutifi district to its south west and north west is Sunyani municipal (Tano North District Annual Report, 2016).

Sampling procedure: A multi-staged sampling technique was adopted in the current study. This involved stratifying the participants into Urban and Rural settings. For all the stages, simple random sampling technique was used in selecting three districts namely; Duayaw Nkwanta, Tanoso and Yamfo district. each district was further stratified into rural and urban. This was to allow fair and equitable distribution and representation of different people from different background and settings. Simple random sampling method was used in entering various houses in the selected places visited. Those found to be eligible were taken through standard protocol of explaining the purpose of the study and seeking their consent voluntarily before commencing the investigations in the presence of community health volunteers. Participants were also given the opportunity to freely opt out in the process of the interviewing if they felt uncomfortable.

Sample size : Using Cochrane's formula 1989, N=Z2 p (1-p)/d2, sample size was calculated.

N represents sample size

Z=confidence level=95% (Z-score standard value=1.96)

p=Estimated percentage of study population=13.0% [13]

d=marginal error=5%

N=198.

Ethics: Ethical clearance for the study was obtained from the Committee on Human Research Publication and Ethics (CHRPE) of the School of Medical Sciences, KNUST, Kumasi (CHRPE/AP/480/16). In addition, approval letter was obtained from the Brong Ahafo Regional Health Directorate and the Tano-North Health Directorate before the study was conducted. All participants (198) of this study signed an informed consent form, in accordance to the CHRPE regulations, before conducting the study.

Eligibility criteria: Inclusion and exclusion criteria: The study included healthy population with no serious physical complain, participants aged 55 years and older, and non-hypertensive participants. Older adults with existing cardiovascular disease/hypertension/stroke/cancer complication and/or less than 55 years of age were excluded from the study.

Body mass index determination: Participants' height was measured with a portable stadiometer (SECA 213, Germany), according to standard WHO protocol (in centimetres). A weighing scale (model: DT602, India) was also used to measure the weight of participants according to standard protocol, while they were in light clothing (without shoes/footwear), to the nearest 0.1 kg. Body Mass Index (BMI) was calculated as weight/height2 (kg/m2).

Blood pressure measurement: Blood pressure reading was taken by trained personnel using a digital sphygmomanometer [14]. Measurements were taken from the left upper arm after participants had relaxed for about 5 minutes. Blood pressure readings were taken three times, with at least 2 minutes interval. The average of the three readings was used for the analysis.

Data analysis: SPSS (Statistical Package for the Social Sciences) version 22 (SPSS Inc Chicago, IL) was used for the data analysis. All variables including; dietary habit, socio-demographic data, Body Mass Index (BMI) status and blood pressure level were categorized and presented as absolute and relative frequencies. Chi-square cross tabulation was performed to find differences in relative frequencies of study variables. Binary logistic regression analysis was performed to determine association between study variables and blood pressure. All tests were 2-tailed, and $p<0.05$ were considered as statistical significance differences.

Results

Socio-demographic characteristics of participants

A total of 198 participants were involved in this study, 62.6% were female and 37.4%, male. Majority of the older adults (38.9%)

were in their seventies, most of them were married (54.5%) and lived in peri-urban communities (66.7%). Majority (53.5%) of the participants did not have any formal education and were doing manual/manpower work (70.7%). Marital status (p-value=0.005) and place of stay (p-value=0.014) was significantly related to blood pressure level of participants **(Table 1)**. Chi-square p-value is significant at p<0.05.

Relationship between dietary habits and blood pressure status of participants

Table 2 presents relationship between dietary habits and blood pressure level of participants. Majority of the participants consumed meals thrice per day (57.1%), took sugar-sweetened drinks (74.7%), ate outside home (80.3%) and chose food pattern based on regular habit (61.6%). Majority of the participants occasionally took sugar-sweetened drinks (50.5%) and ate outside home (42.4%). How often participants took sugar-sweetened beverages (p=0.047) and ate outside home (p=0.017) were significantly related to blood pressure level **(Table 2)**. Chi-square p-value is significant at p<0.05.

Anthropometric status and blood pressure levels of participants

Table 3 shows anthropometric status and blood pressure level of participants. Underweight (7.6%), overweight (19.7%), obesity (10.1%) and abdominal obesity (34.8%) was found among the older adults. Majority of the participants had high systolic (48.5%) and diastolic (36.4%) blood pressure. A higher number (46.0%) of the older adults had high blood pressure **(Table 3)**. BMI- Body Mass Index, WC- Waist Circumference, SBP- Systolic Blood Pressure, DBP- Diastolic Blood Pressure, BP- Blood Pressure. [14]. Relationship between anthropometric data and blood pressure level **Table 4** presents relationship between anthropometric data and blood pressure level of participants. Chi-square cross tabulation analysis showed no significant relationship between body mass index (P=0.588), Waist Circumference (p=0.431) and blood pressure level. Adjusted correlation analysis showed a weak, positive correlation between body mass index and systolic (r=0.240, p=0.001) and diastolic blood pressure (r=0.200, p=0.005) Adjusted for age, gender, BMI- Body Mass Index, WC- Waist Circumference, SBP- Systolic Blood Pressure, DBP- Diastolic Blood Pressure, BP- Blood Pressure, P-value is significant at p<0.05.

Sociodemographic	Total, N (%)	Blood pressure level (mmHg)			Chi-square	P-value
		Normal	Mild	High		
		N=87	N=20	N=91		
Gender					4.334	0.114
Male	74 (37.4)	27 (36.5)	11 (14.9)	36 (48.6)		
Female	124 (62.6)	60 (48.4)	9 (7.3)	55 (44.4)		
Age group (years)					9.155	0.165
55-59	41 (20.7)	22 (53.7)	4 (9.8)	15 (36.6)		
60-64	46 (23.2)	17 (37.0)	7 (15.2)	22 (47.8)		
65-69	34 (17.2)	10 (29.4)	2 (5.9)	22 (64.7)		
70 and above	77 (38.9)	38 (49.4)	7 (9.1)	32 (41.6)		
Marital status					18.734	0.005
Single	12 (6.1)	9 (75.0)	2 (16.7)	1 (8.3)		
Married	108 (54.5)	36 (33.3)	11 (10.2)	61 (56.5)		
Divorced	19 (9.6)	7 (36.8)	3 (15.8)	9 (47.4)		
Widowed	59 (29.8)	35 (59.3)	4 (6.8)	20 (33.9)		
Education status					0.134	0.936
No formal education	106 (53.5)	50 (47.2)	8 (7.5)	48 (45.3)		
Basic	78 (39.4)	35 (44.9)	9 (11.5)	34 (43.6)		
Secondary	7 (3.5)	0 (0.0)	2 (28.6)	5 (71.4)		
Tertiary	7 (3.5)	2 (28.6)	1 (14.3)	4 (57.1)		
Occupation					12.01	0.062
Unemployed	19 (9.6)	9 (47.4)	2 (10.5)	8 (42.1)		
Teaching	8 (4.0)	3 (37.5)	3 (37.5)	2 (25.0)		
Trade/Sales	31 (15.7)	10 (32.3)	1 (3.2)	20 (64.5)		
Manpower/manual	140 (70.7)	65 (46.4)	14 (10.0)	61 (43.6)		
Place of stay					8.487	0.014
Rural	66 (33.3)	33 (50.0)	11 (16.7)	22 (33.3)		
Peri-urban	132 (66.7)	54 (40.9)	9 (6.8)	69 (52.3)		

Table 1: Distribution of blood pressure level by socio demographic parameter.

Dietary habits	Total, N (%)	Blood pressure level (mmHg)			Chi-square	P-value
		Normal	Mild	High		
		N=87	N=20	N=91		
Number of meals daily	N=198				1.877	0.758
Once	2 (1.0)	1 (50.0)	0 (0.0)	1 (50.0)		
Twice	83 (41.9)	36 (43.4)	6 (7.2)	41 (49.4)		
Thrice	113 (57.1)	50 (44.2)	14 (12.4)	49 (43.4)		
Take sugar-sweetened				4.078	0.13	69 (52.3)
Drinks						69 (52.3)
Yes	148 (74.7)	61 (41.2)	13 (8.8)	74 (50.0)		
No	50 (25.3)	26 (52.0)	7 (14.0)	17 (34.0)		
How often (n-148)					12.78	0.047
Daily	14 (7.1)	6 (42.9)	4 (28.6)	4 (28.6)		
2-4 times weekly	34 (17.2)	13 (38.2)	1 (2.9)	20 (58.8)		
Occasionally	100 (50.5)	42 (42.0)	8 (8.0)	50 (50.0)		
Eat outside home					1.202	0.548
Yes	159 (80.3)	68 (42.8)	15 (9.4)	76 (47.8)		
No	39 (19.7)	19 (48.7)	5 (12.8)	15 (38.5)		
How often (n= 159)					13.482	0.017
Daily	22 (11.1)	10 (45.5)	3 (13.6)	9 (40.9)		
2-4 times weekly	53 (26.8)	13 (24.5)	7 (13.2)	33 (62.3)		
Occasionally	84 (42.4)	46 (54.8)	5 (5.9)	33 (39.3)		
Food choice influence					1.498	0.827
Habit	122 (61.6)	50 (41.0)	13 (10.7)	59 (48.4)		
Health/Sickness	27 (13.6)	12 (44.4)	12 (44.4)	3 (11.2)		
Economical	49 (24.7)	25 (51.0)	4 (8.2)	20 (40.8)		

Table 2: Distribution of blood pressure level by dietary habit of participant.

Variable	Frequency, N= 198	Percentage, %	Reference
BMI Kg/m²			
Underweight	15	7.6	<18.5
Normal	124	62.6	18.5-24.9
Overweight	39	19.7	25.0-29.9
Obesity	20	10.1	≥ 30.0
WC cm			
Normal	129	65.2	
Abdominal obesity	69	34.8	>102 for male, >88 for female
SBP mmHg			
Normal	90	45.5	<120
Mild	12	6.1	120-139
High	96	48.5	≥ 140
DBP mmHg			
Normal	73	36.9	<80
Mild	53	26.8	80-89
High	72	36.4	≥ 90
BP level mmHg			
Normal	87	43.9	
Mild	20	10.1	
High	91	46	

Table 3: Anthropometric status and blood pressure level of the participants.

	Chi-square cross tabulation analysis				
Anthropometric	**Blood pressure level (mmHg)**				
	Normal	**Mild**	**High**	**Chi-square**	**P-value**
BMI Kg/m²				4.662	0.588
Underweight	8 (53.3)	1 (6.7)	6 (40.0)		
Normal	57 (46.0)	14 (11.3)	53 (42.7)		
Overweight	17 (43.6)	3 (7.7)	19 (48.7)		
Obesity	5 (25.0)	2 (10.0)	13 (65.0)		
WC cm				1.683	0.431
Normal	53 (41.1)	15 (11.6)	61 (47.3)		
Abdominal obesity	34 (49.3)	5 (7.2)	30 (43.5)		
	Partial Correlation analysis, r (p-value)				
Anthropometric variable	**SBP**	**DBP**			
BMI	0.240 (0.001)	0.200 (0.005)			
WC	0.064 (0.371)	0.111 (0.123)			

Table 4: Relationship between anthropometric data and blood pressure level of the participants.

Predictors of normal blood pressure among older adults

Table 5 presents predicting factors of normal blood pressure level among sampled Ghanaian older adults. Participants who were divorced (OR: 0.5 95% CI: 0.2-0.9, p-value 0.027), did not take sugar sweetened drink (OR: 0.5 95% CI: 0.3-1.0, p-value=0.050) often took sugar-sweetened drink 2-4 times per week (OR: 0.3 95% CI: 0.1-0.8, p-value=0.016) and ate outside home for 2-4 times per week (OR: 0.4 95% CI: 0.2-0.9, p-value=0.033), and chose meals based on health (OR: 0.5 95% CI: 0.2-0.9, p-value=0.036) were more likely to have normal blood pressure **(Table 5)**. Unadjusted binary logistic regression analysis, P-value is significant at P<0.05. OR-Odd ratio, 95% CI-Confidence Interval.

Predicting variables	B	OR (95% CI Lower-Upper)	P-value
Socio demographic		**Normal blood pressure**	
Gender			
Male		1	
Female	-0.7	0.6 (0.3-1.0)	0.056
Age group (years)			
55-59	0.5	1.7 (0.8-3.8)	0.19
60-64	-0.1	0.9 (0.4-1.8)	0.693
65-69	-0.3	0.7 (0.3-1.6)	0.393
70 and above		1	
Marital status			
Single		1	
Married	0.9	2.5 (0.5-12.8)	0.252
Divorced	-0.7	0.5 (0.2-0.9)	0.027
Widowed	-0.6	0.6 (0.2-1.6)	0.294
Place of stay			
Rural	-0.3	0.8 (0.4-1.4)	0.363
Peri-urban		1	
Dietary habits			
Take sugar-sweetened drinks			
Yes		1	
No	-0.7	0.5 (0.3-1.0)	0.05
How often			
None			
Daily	0.2	1.2 (0.3-4.3)	0.807
2-4 times weekly	-1.1	0.3 (0.1-0.8)	0.016
Occasionally	-0.6	0.5 (0.3-1.1)	0.081
Eat outside home			
Yes	-0.3	0.7 (0.4-1.5)	0.755
No		1	
How often			
None		1	
Daily	-0.1	0.9 (0.3-2.7)	0.913
2-4 times weekly	-0.9	0.4 (0.2-0.9)	0.033
Occasionally	0.2	1.2 (0.5-2.6)	0.657
Food choice influence			
Habit			
Health/Sickness reason	-0.7	0.5 (0.2-0.9)	0.036
Economical/Financial	-0.7	0.5 (0.2-1.2)	0.132
Anthropometric			
BMI Kg/m²			
Underweight		1	
Normal	0.7	2.1 (0.5-8.3)	0.281
Overweight	0.9	2.6 (0.9-6.9)	0.06
Obesity	1.1	3.0 (0.9-9.1)	0.057
WC cm			
Normal		1	
Abdominal obesity	-0.4	0.7 (0.4-1.2)	0.195

Table 5: Predictors of normal blood pressure for study participants.

Discussion

In the current study, dietary habits, BMI status and blood pressure levels of older adults at Tano North District in the Bono Ahafo Region of Ghana were assessed. The findings showed regular dietary habits of older adults; which majority consumed three square meals and a snack, which is a healthy way of eating. Although, majority (74.7%) of the older adults responded affirmatively to consuming sugar-sweetened beverages and ate outside home (80.3), less numbers daily or weekly engaged in these practices. The Dietary Approaches to Stop Hypertension (DASH) intervention study conducted by [15] and also the Oxford Fruit and Vegetable study [16] both showed that High Blood Pressure can be minimized using diet rich in fruit, vegetables, reduced-fat dairy products and diets low in saturated fat. With respect to factors that contributed to choose of food intake, 61.6% of the participants stated regular habits as the major factor with 13.6% stating health reason for the choice of food intake. This meant that participants were likely to choose food based on what they are used to rather than the nutrition value of the food. There was however no significant relationship (P>0.05) between dietary habits and blood pressure level of participants in the current study.

The prevalence of overweight, obesity and abdominal obesity among older adults was 19.7%, 10.1% and 34.8%, respectively. A study by [17] found higher prevalence of overweight (30.9%) among older adults, whereas, [18] found lower prevalence of overweight (15.3%). Close to 5 out of 10 older adults (48.5%) in this study had high systolic blood pressure and 36.4% had high diastolic blood pressure. The prevalence of high blood pressure was 46.0% among the older adults; explaining the fact that obesity, abdominal obesity and hypertension is increasingly becoming endemic among the aged population in Ghana, and so needs critical attention by stakeholders to reduce/prevent the menace. Also, a study by [19] among older adults in Sunyani municipality found that, 75.2% had high blood pressure and 11.2% were obese. When age and gender of older adults were adjusted in the correlation analysis model, there was a weak, positive correlation between body mass index and systolic (r=0.240, p=0.001) and diastolic blood pressure (r=0.200, p=0.005). The correlation was weak and if considered, can be interpreted as; increasing body mass index of older adults was associated with increasing systolic and diastolic blood pressure and vice versa.

Findings from regression analysis revealed that participants who were divorced (OR: 0.5 95% CI: 0.2-0.9, p-value 0.027) were at the lowest risk of having normal blood pressure. Participants who did not take sugar sweetened drink (OR: 0.5 95% CI: 0.3-1.0, p-value=0.050) were less likely to have normal blood pressure. However, those who often take sugar-sweetened drink (OR: 0.3 95% CI: 0.1-0.8, p-value=0.016) were the least likely to have normal blood pressure. Older adults who ate outside home for 2-4 times per week (OR: 0.4 95% CI: 0.2-0.9, p-value=0.033) were the least likely to have normal blood pressure and those who chose meals based on health (OR: 0.5 95% CI: 0.2-0.9, p-value=0.036) were the least likely to have normal blood pressure.

Overall, although, majority of the older adults relied on street foods for their daily meals and some took sugar-sweetened meals and chose meals influenced by regular habit, however, a substantial number consumed three meals daily. Obesity, abdominal obesity and high blood pressure were associated among the older adults and these are risk factors of cardiovascular diseases, diabetes and hypertension. The CVDs risk factors predispose older adults to increased risk of developing some of these chronic diseases such as diabetes, hypertension and cardiovascular diseases. Hence, there is a need for nutrition and health policy, intervention and education by stakeholders, targeting the geriatrics in the population, so as to prevent/reduce the risk of chronic diseases.

Conclusion

The study found that consumption of street foods (80.3%) and sugar-sweetened foods (74.7%), eating three meals per day (57.1%) and choosing meals based on regular habit (61.6%) were the dietary habits practiced by majority of the studied older adults. Obesity, abdominal obesity and high blood pressure were associated among the older adults and these are risk factors of cardiovascular diseases, diabetes and hypertension. There is the need for nutrition and health policies, intervention and education programmes to assist geriatrics to improve upon their dietary habits and food choices, as well as prevent/reduce the risk of chronic diseases.

Conflict of Interest

The authors declare no competing interest for this study.

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