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Prevalence of Hypertension and Its Association with Blood Groups among Sandwich Students in Valley View University Community

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Abstract

Background: Hypertension is a well-known disease amongst common people as every third person is affected by the condition. Hypertension has been recognized as the best and traditional risk factor for cardiovascular diseases. Results from sequential studies show a growing prevalence of hypertension in emerging countries, probably caused by urbanization, aging population, modifications in dietary habits, and social stress (Amponsem-Boateng, 2017).

Objective: To determine prevalence of hypertension and its association with blood groups among sandwich students at the valley view university community in Accra.

Methodology: A randomly selected population consisting of 187 out of about 366 first year sandwich students from the faculty of education. Forty point six (40.6%) female and 59.4% of male between the ages of 20 and 39 were involved in this study. Data was 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 was 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: Among the blood type, the prevalence of hypertension was higher among group AB (33.3%) followed by group A (16.7%) group O (9.0%) and group B (1.8%). Statistically significant difference was found in blood groups ($P < 0.016$)

Conclusion: The occurrence of hypertension was found to be highest in blood group AB and A, but it was statistically not significant. In our study, we found that the AB blood group was more susceptible to hypertension as compared to blood group A, O and B.

Keywords: Prevalence, Body Mass Index, Hypertension, Blood Group, Students, Valley View University

Introduction

Hypertension is a well-known disease among common people as every third person is affected by the condition (Jindal et al, 2016). It has been recognized as the best and traditional risk factor for cardiovascular diseases (Adebolu&Naidoo, 2014). Though, mostly preventable and changeable, unrestrained hypertension has been accounted as terribly affecting the global population's health causing cerebrovascular accident and cardiac diseases (Allagoa Erefagha et al, 2014). Hypertension troubles more than a quarter of the world's grown-up population, and this percentage is likely to reach 29% by 2025 (Cappuccio, F. P. et al, 2008), with its prevalence occurring largely in developing countries (Guzmán-Guzmán, 2013). Hypertension is considered as having a blood pressure reading of more than 140/90 mmHg over a number of weeks. Along with major cardiovascular risk factors, hypertension groups with obesity, dyslipidemia, and glucose intolerance, which in turn link with unrestrained blood pressure, further increasing total risk ((Kaur J., 2014). Earlier studies have shown that high blood pressure is associated with many genetic markers and familial patterns (Varghese A, et al, 2015). There are also empirical evidences suggesting its linkage with blood groups but such associations remain controversial or inconclusive. As far as the genetic makeup of an individual is concern, the ABO system becomes clinically significant

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as an intriguing field for detailed research (Shireen Jawed et al, 2017). The ABO blood group system was the first human blood group system discovered by Landsteiner in 1900 and it is the only system in which antibodies are consistently and predictably present in the serum of normal individuals whose red cells lack the antigens (Kaur Manjeet et al, 2016). Other studies suggest that those carrying the ABO blood group sublet A, group B, group O have a greater risk of developing hypertension. On the contrary, studies could not find relevant data in favour of subjects with the ABO blood group being susceptible to hypertension. Though the blood type cannot be modified as a risk factor, having knowledge of the relationship between blood groups and heart disease can help to improve the control of other modifiable risk factors of developing hypertension (Bosu W.K, 2010). This present study was performed to determine the prevalence of hypertension and its association with blood groups among sandwich students in valley view university community.

Methodology

Study population

This study was concluded in 2017 at Valley View University in Accra Ghana. A randomly selected population consisted of 187 out of about 366 first year sandwich students from faculty of education, comprising 40.6% female and 59.4% of male between the ages of 20 and 39.

Data Collection and Procedures

The method of data collection comprised self-administered questionnaire and physical assessment.

Biochemical Measurements

Conventional slide agglutination tests were done to determine the blood groups and Rh factor.

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 ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg. Average of two systolic and diastolic blood pressure measurements was calculated and was used as variables in the analysis.

Statistical Analysis

Data were analyzed using the SPSS programme IBM version 20. Descriptive statistics for all studied variables and chi-square test were used. 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

The mean values of physical measurements are shown in Table 1. The results indicate that the average age 28.27years, weight was 66.51kg, height was 162.65cm,

systolic blood pressure (SBP) was 113.39 mmHg and diastolic pressure (DPB) was 73.59mmHg.

Table 1: General characteristic of the study population

Variables	Minimum	Maximum	Mean	SD
Age in Years	23.00	39.00	28.27	3.479
Weight	41.00	121.00	66.51	13.04
Height	115.00	190.00	162.65	9.80
SBP(mmHg)	90.00	180.00	113.39	13.64
DBP(mmHg)	45.00	110.00	73.59	9.83

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

Age Group	Mean SBP \pm SD	Mean DBP \pm SD
20-24	111.1579 \pm 11.99196	71.6842 \pm 8.64775
25-29	112.4298 \pm 13.48612	72.5789 \pm 9.17566
30-34	113.9756 \pm 9.14737	75.0000 \pm 9.47365
35-39	123.2308 \pm 23.57313	80.8462 \pm 14.65063
Total	113.3904 \pm 13.64459	73.5936 \pm 9.83113

Table 3: Distribution of mean systolic and diastolic blood pressure by blood group among participants

Blood Group	Mean SBP \pm SD	Mean DBP \pm SD
A	115.14 \pm 17.038	74.83 \pm 10.56
B	111.05 \pm 11.33	72.21 \pm 8.13
AB	124.00 \pm 25.30	81.6 \pm 18.07
O	113.44 \pm 12.21	73.4157 \pm 9.68
Total	113.39 \pm 13.64	73.59 \pm 9.83

Table 4 represents the distribution of mean systolic and diastolic blood pressure by body mass index among participants. Results indicate that the overall mean systolic blood pressure was (mean \pm SD) 113.39 \pm 13.64mmHg with mean diastolic pressure was 73.59 \pm 9.83mmHg. Both mean systolic blood pressure and diastolic blood pressure increased gradually with body mass index (BMI) as shown on table 4 below.

Table 4: Distribution of mean systolic and diastolic blood pressure by blood group among participants

BMI	Mean SBP \pm SD	Mean DBP \pm SD
Underweight	106.17 \pm 8.72735	70.00 \pm 17.03
Normal	111.6832 \pm 12.26	72.3069 \pm 8.35
Overweight	115.22 \pm 12.25	74.86 \pm 9.26
Obesity	117.53 \pm 19.10	76.53 \pm 12.82
Total	113.39 \pm 13.64	73.59 \pm 9.83

Table 5 presents the percentage of blood type according to age, gender, body mass index and blood pressure of the study population. Results indicate that prevalence of hypertension (15.4%) was higher among the ages of 35-39years and lowest (5.2%) at the ages of 20-24years. The prevalence of hypertension in females 8(105%) was slightly higher than males (8.1%). Higher prevalence of hypertension was recorded among underweight (16.7%) and Obese (16.7%) participants. Statistically significant difference was not found in age, gender and body mass index. Among the blood type prevalence of hypertension was higher among group AB (33.3%) followed by group A (16.7%) group O (9.0%) and group B (1.8%). Statistically significant difference was found in blood groups ($P < 0.016$)

Table 5: Distribution of Blood Type According to Age, Gender, BMI and Blood Pressure

Parameters	Normal n (%)	Hypertension n (%)	To-tal n (%)
Age Chi-Square= 4.104, P=0.763			

20-24	18(94.7)	1(5.3)	19(10.2)
25-29	103(90.4)	11(9.6)	114(61.0)
30-34	38(92.7)	3(7.3)	41(21.9)
35-39	11(84.6)	2(15.4)	13(7.0)
Gender Chi-Square= 0.319, P=0.572			
Female	68(89.5)	8(10.5)	76(40.6)
Male	102(91.9)	9(8.1)	111(59.4)
BMI Chi-Square = X² =4.994, p=0.172			
Underweight	5(83.3)	1(16.7)	6(3.2)
Normal	96(95.0)	5(5.0)	101(54.0)
Overweight	44(88.0)	6(12.0)	50(26.7)
Obesity	25(83.3)	5(16.7)	30(16.0)
Blood Type Chi-Square= 10.384, P<0.016			
A	30(83.3)	6(16.7)	36(19.3)
B	55(98.2)	1(1.8)	56(29.9)
AB	4(66.7)	2(33.3)	6(3.2)
O	81(91.0)	8(9.0)	89(47.6)
Total	170(90.9)	17(9.1)	187(100)

Blood type Analysis for Hypertension

The results of binary logistic regression analysis, including the odds ratio for each of the blood type (A, B, AB and O) are presented in table 4. Significant risk factor was related to blood group B. Other blood types recorded no significant associations.

Table 4: Association between prevalence hypertension and blood type by binary logistic regression analysis

Parameter	Odd ratio [95% CI]	p-value
Blood type		
A	1.0	-
B	0.091[0.010-0.791]	0.030
AB	2.500[0.370-16.888]	0.347
O	0.494[0.158-1.542]	0.224

Discussion

Hypertension is a major public health problem in Ghana, swiftly increasing in urban and rural populations (Baig M. et al, 2015). Majority of hypertensive subjects remain undetected due to its initial asymptomatic course, and thus its control is insufficient. This calls for urgent prevention and control measures for hypertension. The present study revealed that about 9.1% of sandwich teachers attending valley View University were hypertensive. In similar studies, the prevalence of hypertension was reported to be low as 7.5% in Jeddah, Saudi Arabia and about 5.7% in Fayoum University, Egypt (Mona Soliman et al, 2014).

Aging has become a worldwide social challenge and prevalence of hypertension increased with age. However, aging itself is not a disease but a period in the life of an individual (Basu G, & Biswas S., 2013). Association with age and hypertension has been seen in most of studies; our findings document an increase of systolic blood pressure and diastolic blood pressure with age. Nevertheless statistical significance association between age and hypertension was not found. The current study reveals no significant association between hypertension and gender. Previous study has documented that men have higher hypertension than women (Amponsem-Boateng, 2017). These findings depict that men are far less likely to be hypertensive compared to women as shown in table 3. The results suggest that regular medical screening is critical for improving hypertension awareness among young adults.

Studies suggest the genetic basis of essential hypertension in populations of different ethnicity. Thus, a non-

modifiable factor like blood group can be used as a predictor for hypertension and its awareness in the population can be used to initiate lifestyle modifications in the susceptible category. It can be concluded that there is association between ABO blood groups and essential hypertension ($P < 0.016$). This is consistent with various studies which document significant association of hypertension with blood group (Nasreen AR. 2006). Although all blood is made of the same basic elements, not all blood is identical (Kaur M, 2014). In fact, there are eight different common blood types, which are determined by the presence or absence of certain antigens^(ibid). The current observed that the AB blood group seen more in the hypertension followed by blood group A, O and B whereas several studies show significant association of hypertension with blood group B (Sachdev B., 2011).

Conclusion

Blood group AB was the most common blood group and it was associated with hypertension. The occurrence of hypertension was found to be highest in blood group AB and A, but it was statistically not significant. In our study, we found that the AB blood group was more susceptible to hypertension as compared to blood group A, O and B.

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