Original Research Article

A Study of Incidence and Prevalence of Hypertension, Diabetes and Obesity with Blood Type in Postmenopausal Females in Port Harcourt

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Abstract: Hypertension, diabetes mellitus and obesity play a crucial role in mediating ill-health, and are commonly seen in postmenopausal women. The objective of this study was to explore the possibility that a person's risk of developing hypertension, diabetes or obesity can be influenced by their ABO blood type, Rhesus factor or both, among post-menopausal females. This cross-sectional study covered randomly selected 201 postmenopausal women, mean age 53.5±6.6 (±SD) years, from Port Harcourt, Rivers State, Nigeria. Blood glucose, blood pressure and body mass index measurements and ABO/Rhesus blood groups of all the participants were determined and correlated for each other. Analysis of the data revealed that in the ABO/rhesus blood system, the prevalence of hypertension , diabetes mellitus and obesity was 43.3%, 38.8% and 13.9%, which 14.4% versus 13.2%, 13.9% versus 13.2%, and 5.0% versus 4.0% are associated with O versus B rhesus positive blood groups respectively and are invariably higher than other blood groups. Data analysis further revealed a complex and positive association thus: hypertension comorbidly occurred with diabetes (21.5%), overweight (20.9%), normoglyceamic (18.9%), normal body weight (13.0%), obesity (9.4%) and prediabetes (2.9%) respectively. Additionally, diabetes combined with overweight (20.4%), prehypertension (12.6%), obesity (9.4%), normal body weight (9.0%) and normotension (4.7%). More so, obesity coexisted with prediabetes (4.5%) and/or prehypertension (4.5%). Correlation analysis revealed that the incidence and prevalence of hypertension, diabetes or obesity risk for blood group O subjects are in the order of the ratio 1:1 compared with subjects having B blood group. High blood pressure comorbidly occurred with raised blood glucose (38.8%), than increased body mass index (36.8%). The present study is the first to assess the relationship between ABO/Rhesus blood groups, blood pressure, blood glucose or body mass index in postmenopausal Nigerian women resident in the Niger Delta region. Findings of the present study revealed that the participants with O and B blood types are at high risk of hypertension, type 2 diabetes, obesity together with prediabetes, prehypertension and overweight. Our study further showed strong relationship between an increase body mass index and/or with ABO/rhesus blood group prevalence and hypertension in postmenopausal women.
Keywords: ABO blood group, Rhesus factor, blood pressure, blood glucose, BMI, postmenopausal women, Niger Delta region.

INTRODUCTION

Interest in hypertension, diabetes or obesity are becoming major health concern, especially they are silent killers, because they have no warning signs or symptoms, but contribute to increased risk of certain diseases and premature mortality [1-4]. Although, these are largely from Caucasian studies, it is not clear whether the results would be the same for other ethnic groups.

It has long been established that the ABO and rhesus blood systems cannot be changed [5, 6], consequently, knowledge of blood type prevalence may serve as a predictor of burden of disease of clinical interest [7-10]. Accordingly, specific ABO blood types

has been associated with prevalence of hypertension, type 2 diabetes, or obesity [11-18]. Though the mechanisms responsible are currently unknown. Environment [7, 8, 19] and ethnicity [14, 20] have also been suggested to be contributory factors in the development of these diseases. There have been relatively few studies of the incidence and prevalence of blood pressure, blood glucose and body mass index with ABO and rhesus blood group systems, especially in postmenopausal females. Indeed, concomitant cardiovascular risk factors such as hypertension, diabetes mellitus, and obesity are commonly seen in postmenopausal women [4, 21]. An increase in body mass index has also been suggested to influence postmenopausal hypertension [22]. Authors who

investigated changes in high blood pressure and diabetes around blood type, however, drew inconsistent and unconvincing conclusions [15-18, 23, 24]; hence the ABO/ Rhesus blood groups require further in-depth studies.

This study aimed to investigate whether a person's risk of developing hypertension, diabetes, obesity together with coexistence of prediabetes and prehypertension may be associated with their blood types, Rhesus factors or both, especially in post-menopausal females in Port Harcourt, for utilization in healthy lifestyle planning.

MATERIALS AND METHODS
Study population
In the present study, 201 randomly selected postmenopausal women aged 45 to 70; mean age 52.3 ± 2.4 ($\pm$SD) years were employed for the research between October and December 2015. Studies were carried out at the Community Health Centre, Rumuolumeni Community, Obio-Akpor Local Government Area in the cosmopolitan city of Port Harcourt, Rivers State, Niger Delta region of Nigeria. Subjects resident in the community were recruited after fulfilling all the eligibility criteria, and informed consent sort. The health risks were not detected by sufferers' consistence with previous reports [8].

Data Collection
Blood pressure (systolic/diastolic mmHg) was measured with digital Sphygmomanometer and classified low blood pressure < 90/60, healthy blood pressure 90 -120/60 - 80, prehypertension 121 – 139/81 - 89 and hypertension >140/>90. Body mass index (BMI) which is the most commonly used indictor of obesity in population studies, was calculated using the internationally accepted standard formula as weight in kilograms divided by height in meters squared (kg/m^2) (BMI = weight (kg)/height^2 (m)). BMI (kg/m^2) < 18.5 underweight, 18.5 - 24.9 normal, 25 – 29.9 overweight, and > 30 obese. Random blood glucose of each of the subjects was determined using digital glucometer. Subsequently, the results were classified (mmol/L): Low <3.5, normal 3.5 - 6.0, prediabetes 6.1 - 6.9 and diabetes > 7.0. [8,16]. Blood group was determined by finger pricked using a lancet under aseptic conditions and subjected to the determination of ABO and Rhesus blood group by the tile method using antisera. This study was carried out within accepted ethical norms.

Statistical Analysis
Analysis was performed using SPSS (Statistical Package for Social Sciences, SPSS Inc., Chicago, IL, USA) version 16 for windows. Descriptive statistics were employed for qualitative variables and presented in the form of frequency and percentage and as mean± S.D. ANOVA was done to analyze the comparison between the groups P values less than 0.05 were regarded as statistically significant.

RESULTS
This study to identify the incidence and the prevalence of hypertension, diabetes, obesity together with coexistence of prehypertension and prediabetes in ABO/rhesus blood groups were carried out among randomly selected 201 post-menopausal women, mean age 53.5 ± 6.6 ($\pm$SD) years. Their ABO blood group and Rhesus status, body mass index, blood pressure (systolic and diastolic), and blood glucose were determined and correlated for each other, and the results are presented as shown in tables. Majority of the people in the population who have blood group O (44.8%) were much higher than those in group B (33.8%), followed by group A (15.9%) and then AB (5.5%), with ratio 8:6:3:1. Overall prevalence of rhesus negative blood group was 7.0%, 7.5%, 1.5% and 1.0% for blood groups O, B, A and AB and are invariably lower than rhesus positive blood groups. The ratio of total rhesus positive blood group (83.0%) in the population and negative (17.0%) distribution was 5:1.

The mean values of blood pressure (systolic blood pressure/diastolic blood pressure), random blood glucose and body mass index for the population was $138\pm24.4/91\pm14.4$ mmHg, 6.5 ± 2.1mmol/L, and 26.5 ± 9.0kg/m^2 respectively, indicating a tendency for hypertension, diabetes and obesity in the population.

Distribution of blood pressure with ABO blood group
Tables 1 and 2 presents the number and percentage distribution frequencies of systolic and diastolic blood pressures with ABO and RhD blood groups for the cohort. Table 3 gives the mean percentage relation between blood pressure and blood type. The incidence of elevated blood pressure (>140/>90mmHg) or hypertension in both systolic and diastolic blood pressure was strongly associated with positive blood group O (14.4%) and group B (13.2%) than A (7.0%) or AB (2.0%). Hypertension risk for blood group O subjects are in the order of the ratio 1:1 compared with subjects having B blood group. Incidence of prehypertension (121-139/81-89 mmHg) was also strongly linked with positive ABO blood sublets O (10.7%) and B (6.2%) than A (2.7%) or AB (1.7%). Prehypertension risk for O blood group subjects is in the ratio of 2:1 compared with subjects having B blood group. The median percentage incidence of high blood pressure defined as hypertension ($159\pm21.1/104\pm11.9$mmHg, 43.3%) of the general population was statistically significantly higher than prehypertension ($130\pm4.1/86\pm2.6$ mmHg, 25.9 %,) versus normotension ($114\pm6.0/76\pm5.3$mmHg, 30.4 %,)(p<0.05). Incidence of hypertension , prehypertension and normotension associated with rhesus negative (RhD-) blood groups was 6.7%, 4.5% and 5.8% and are invariably lower than 36.6%, 21.4% and 24.6% for

rhesus positive blood groups respectively. The incidence of raised blood pressure (prehypertension + hypertension,) in ABO and rhesus blood group was 69.2% and O and B blood groups was 29.8% and 24.5% followed by A 10.7%, and the least AB 4.3% respectively. The ratio of raised blood pressure risk in blood group O subjects to B was 1:1

Distribution of blood glucose with ABO blood group

The relationship between blood glucose with ABO and RhD blood groups are explained in Table 4. A highly significant incidence of raised blood glucose level (>7.0 mmol/L) or diabetes was associated with rhesus positive blood sublets O (13.9%) and B (13.4%) than blood groups A (3.5%) or AB (1.5%). Diabetes risk for blood group O subjects is in the ratio of 1:1 compared with subjects having B blood group. The incidence of prediabetes was 6.0%, 2.0% and 1.5% for rhesus positive blood groups O, A, and AB respectively. Incidence of diabetes, prediabetes and normoglyceamic was 32.3%, 9.5%, and 40.3% for the ABO rhesus positive blood groups subjects, while for the general population was 38.8%, 11.0% and 49.3% respectively. The prevalence of high blood glucose (prediabetes + diabetes) in the ABO and rhesus blood group was 41.8% of which blood group O and B was 21.9% and 17.4% respectively followed by A 5.5% then AB 4.0%. The ratio of high blood glucose risk in blood group O compared with group B was 1:1.

Distribution of body mass index with ABO blood group

Table 5 shows the relationship between the distribution of body mass index and ABO blood group and Rhesus factor (RhD). Increased body mass index defined as obesity (>30kg/m2) was also strongly associated with positive blood group O (5.0%) and group B (4.0%) than groups A (1.5%) or AB (1.0%). The incidence of obesity, overweight and normal body weight was 11.4%, 21.9% and 49.8% among rhesus positive blood group (RhD+) subjects and invariably higher than rhesus negative blood group and for the overall studied population was 13.9%, 27.4% and 58.8% respectively. The prevalence of increased body mass index (overweight + obesity) in the ABO and rhesus blood group was 41.3%, of which blood group O, B, A and AB was 18.5%, 15.0%, 5.0% and 3% respectively. The ratio of increased body mass index risk in blood group O compared with B was 1:1.

Association of blood glucose and blood pressure

Table 6 gives the possible relation between blood glucose and blood pressure of the cohort. Elevated blood glucose level defined as diabetes mellitus (> 7.0 mmol/L) increased with increasing blood pressure and verse vasa. Diabetes mellitus

comorbidly occurred with 4.7%, 12.6% and 21.5% normotensive, prehypertensive and hypertensive respectively. While hypertension coexisted with 21.5%, 2.9% and 18.9% diabetes, prediabetes and normoglyceamic respectively. In all, the association between blood glucose and blood pressure revealed that the prevalence of diabetes, prediabetes and normoglycaemia was 38.8%, 11.0% and 49.3% for the population, and hypertension, prehypertension and normotension was 43.3%, 25.9% and 30.4% respectively.

Association of body mass index with blood glucose

The association of body mass index and blood glucose are depicted in Table 7. Body mass index defined as obesity (BMI >30kg/m^2) increase with increased in blood glucose level, obesity comorbidly occurring with 4.5% prediabetes and 9.4% diabetes.

Diabetes coexisted among 9.4%, 20.4% and 9.0% obese, overweight and normal body weight, while prediabetes comorbidly occurred with 4.5%, 2.5% and 4.0% obesity, overweight and normal body weight respectively. Association between body mass index and blood glucose revealed that the prevalence of obesity, overweight and normal body weight was 13.9%, 27.4% and 58.8% in the population and diabetes, prediabetes and normoglyceamic was 38.8%, 11% and 49.3% respectively.

Association of blood pressure and body mass index

Table 8 shows the association between blood pressure and body mass index of the cohort. Hypertension (>140/>90 mmHg) decrease with increased in body weight. Hypertension coexisted with 9.4%, 20.9% and 13.0% obese, overweight and normal body weight respectively. Whereas, the tendency of developing obesity increase with increased in blood pressure. Obesity (BMI > 30kg/m2) comorbidly occurred with 4.5% and 9.4% prehypertensive and hypertensive respectively. Overweight coexisted with 20.9%, 2.0% and 4.5% hypertension, prehypertension and normotension respectively. Association of blood pressure and body mass index revealed that the prevalence of hypertension, prehypertension and normotension was 43.3%, 25.9% and 30.4% in the population while obesity, overweight and normal body weight was 13.9%, 27.4% and 58.8% respectively.

Generally, high blood pressure (>121/81 mmHg) comorbidly occurred with 38.8% raised blood glucose (>6.0 mmol/L) than increased body mass index (>25kg/m2) by 36.8%. Whereas elevated blood glucose (>6.0 mmol/L) coexisted with raised blood glucose (>6.0 mmol/L) by 36.8%.

Table-1: Number and percentage distribution of systolic blood pressure with blood type

Blood Type		Classification of Systolic Blood Pressure (mmHg)				Overall Prevalence (%)
		Low <90 N (%)	Normotensive 90-120 N (%)	Prehypertensive 121-139 N (%)	Hypertensive >140 N (%)	
A+		0.0	8(4.0)	6(3.0)	15(7.5)	14.5
A-		0.0	2(1.0)	0.0	1(1.0)	2.0
B+		0.0	15(7.5)	12(6.0)	26(12.9)	26.4
B-		0.0	3(1.5)	7(3.5)	5(2.5)	7.5
AB+		0.0	2(1.0)	4(2.0)	3(1.5)	4.5
AB-		0.0	2(1.0)	0.0	0.0	1.0
O+		0.0	24(12.0)	19(9.5)	33(16.4)	37.9
O-		0.0	4(2.0)	4(2.0)	6(3.0)	7.0
Over All Total	RhD+ (%)	0.0	49(24.4)	41(20.4)	77(38.3)	83.1
	RhD- (%)	0.0	11(5.5)	11(5.5)	12(6.0)	17.0
Over all Prevalence (%)		0.0	60(29.9)	52(25.9)	89(44.3)	

Table-2: Number and percentage distribution of Diastolic Blood Pressure with blood type

Blood Type		Classification of Diastolic Blood Pressure (mmHg)				Overall Prevalence (%)
		Low <60 N (%)	Normotensive 61-80 N (%)	Prehypertensive 81-90 N (%)	Hypertensive >90 N (%)	
A+		0.0	11(5.5)	5(2.5)	13(6.5)	14.5
A-		0.0	0.0	1(0.5)	2(1.0)	1.5
B+		1(0.5)	12(6.0)	13(6.5)	27(13.4)	25.9
B-		0.0	7(3.5)	3(1.5)	5(2.5)	7.5
AB+		0.0	1(0.5)	3(1.5)	5(2.5)	4.5
AB-		0.0	0.0	0.0	2(1.0)	1.0
O+		1(0.5)	26(13.0)	24(12.0)	25(12.4)	37.9
O-		0.0	5(2.5)	3(1.5)	6(3.0)	7.0
Over All Total	RhD+ (%)	0.0	50(24.9)	45(22.4)	70(34.8)	82.8
	RhD- (%)	0.0	12(6.0)	7(3.5)	15(7.5)	17.0
Overall Prevalence (%)		2(1.0)	62(30.9)	52(25.9)	85(42.3)	

Table-3: Percentage distribution of blood pressure with blood type

Blood Type	Classification of Blood Pressure (mmHg)				Blood Type Distribution (%)
	Low (<90/<60)	Normotensive 90-120/61-80	Prehypertensive 121-139/81-89	Hypertensive >140/>90	
A	0.0	5.2	3.0	7.7	15.9
B	0.25	9.2	8.7	15.8	33.8
AB	0.0	1.2	1.8	2.5	5.5
O	0.25	14.7	12.4	17.4	44.8
Rh(D+)	0.0	24.6	21.4	36.6	83.0
Rh(D-)	0.0	5.7	4.5	6.7	17.0
Overall Prevalence (%)	0.5	30.3	25.9	43.3	

Table-4: Number and percentage distribution of blood glucose with blood type

Blood Types		Classification of Random Blood Glucose (mmol/L)				Overall Prevalence (%)
		Low <3.5 N (%)	Normoglycaemia 3.5-6.0 N (%)	Pre-diabetes 6.1-6.9 N (%)	Diabetes >7.0 N (%)	
A+		0.0	18(9.0)	4(2.0)	7(3.5)	14.5
A-		0.0	3(1.5)	0.0	0.0	1.5
B+		2(1.0)	24(12.0)	0.0	27(13.4)	26.4
B-		0.0	7(3.5)	0.0	8(4.0)	7.5
AB+		0.0	3(1.5)	3(1.5)	3(1.5)	4.5
AB-		0.0	0.0	1(0.5)	1(0.5)	1.0
0+		0.0	36(17.9)	12(6.0)	28(13.9)	37.8
O-		0.0	8(4.0)	2(1.0)	4(2.0)	7.0
Over All Total	RhD+ (%)	2(1.0)	81(40.3)	19(9.5)	65(32.3)	83.1
	RhD- (%)	0.0	18(9.0)	3(1.5)	13(6.5)	17
Over all Prevalence (%)		2(1.0)	99(49.3)	22(11.0)	78(38.8)	

Table-5: Number and percentage distribution of body mass index with blood type

Blood Type		Classification of Body Mass Index (kg/m2)				Overall Prevalence (%)
		Underweight <18.5 N (%)	Normal weight 18.5-24.5 N (%)	Overweight 25 -29.5 N (%)	Obese >30 N (%)	
A+		0.0	20(10)	6(3)	3(1.5)	14.5
A-		0.0	2(1.0)	0.0	1(0.5)	1.5
B+		0.0	31(15.4)	14(7.0)	8(4.0)	26.4
B-		0.0	7(3.5)	5(2.5)	3(1.5)	7.5
AB+		0.0	5(2.5)	2(1.0)	2(1.0)	4.5
AB-		0.0	0.0	2(1.0)	0.0	1.0
0+		0.0	44(21.9)	22(11.0)	10(5)	37.9
O-		0.0	9(4.5)	4(2.0)	1(0.5)	7.0
Over All Total	RhD+ (%)	0.0	100(49.8)	44(21.9)	23(11.4)	83.1
	RhD- (%)	0.0	18(9.0)	11(5.5)	5(2.5)	17.0
Overall Prevalence (%)		0.0	118(58.8)	55(27.4)	28(13.9)	

Table-6: Percentage association of blood glucose and blood pressure.

Blood Pressure (mmHg)	Classification of Random Blood Glucose (mmol/L)				Overall Prevalence (%)
	Low <3.5	Normoglycaemia 3.5-6.0	Pre-diabetes 6.1-6.9	Diabetes >7.0	
Low(<90/<60)	0.5	0.0	0.0	0.0	0.5
Normotensive (90-120/61-80)	0.5	18.9	6.3	4.7	30.4
Prehypertensive (121-139/81-89)	0.0	11.5	1.8	12.6	25.9
Hypertensive (>140/>90)	0.0	18.9	2.9	21.5	43.3
Over all Prevalence (%)	1.0	49.3	11.0	38.8	

Table-7: Percentage association of body mass index and blood glucose.

Random Blood Glucose (mmol/L))	Classification of Body mass index (kg/m^2)				Overall Prevalence (%)
	Underweight (<18.5)	Normal weight (18.5-24.9)	Overweight (25.0-29.9)	Obese (>30)	
Low (<3.5)	0.0	1.0	0.0	0.0	1.0
Normoglycaemia (3.5-6.0)	0.0	44.8	4.5	0	49.3
Pre-diabetes (6.1-6.9)	0.0	4.0	2.5	4.5	11.0
Diabetes (>7.0)	0.0	9.0	20.4	9.4	38.8
Over all Prevalence (%)	0.0	58.8	27.4	13.9	

Table-8: Percentage association of blood pressure with body mass index.

Body Mass Index (kg/m^2)	Classification of Systolic Blood Pressure (mmHg)				Overall Prevalence (%)
	Low (<90/<60)	Normotensive (90-120/61-80)	Prehypertensive (121-139/81-89)	Hypertensive (>140/>90)	
Underweight(<18.5)	0.0	0.0	0.0	0.0	0.0
Normal weight (18.5-24.9)	0.5	25.9	19.4	13.0	58.8
Overweight (25.0-29.9)	0.0	4.5	2.0	20.9	27.4
Obese (>30)	0.0	0.0	4.5	9.4	13.9
Over all Prevalence (%)	0.5	30.4	25.9	43.3	

DISCUSSION

ABO and rhesus blood types generally are known to affect occurrence and development of various pathogenic processes within the body. Increased blood glucose and elevated blood pressure generally are important cardiovascular risk factors. In our study we found that the presence of both O and B blood groups contribute to an increased prevalence and incidence of hypertension, diabetes, obesity together with prediabetes and prehypertension risk in postmenopausal subjects. Interestingly, we observed that the association was equally for O blood group compared to B. Correlation analysis revealed that the ratio of the prevalence of high blood pressure (>121/81 mmHg), raised blood glucose (>6.1 mmol/L) and increased body mass index (>25kg/m^2) association with rhesus blood group O and B was 1:1:2. Moreover, the ratio of the prevalence of high blood pressure (>121/81 mmHg) association with raised blood glucose (>6.0 mmol/L) as well as the prevalence of increased body mass index (>25kg/m^2) association either with high blood pressure (>121/81 mmHg) or raised blood glucose in the ABO and rhesus blood groups was 1:1:1. Possibly, the synergism between blood type, hypertension, diabetes, and obesity, may make it difficult to differentiate the influence of each factor, but combined could jointly accelerate the development of postmenopausal risks. On the contrary, similar study from North India [15] reported only the association of O blood group with postmenopausal hypertension. The disparity might probably be attributable to ethnicity and/or environmental factors, which needs further studies.

Importantly, our findings showed high incidence of high blood pressure than other disease type dominant in subjects having O and B blood groups, suggesting that these subjects are at serious risk for heart disease and even stroke [4]. Interestingly, we also observed preponderance of high blood pressure (>121/81mm Hg) with increased body mass index (BMI >25kg/m^2) as well as ABO/rhesus blood group prevalence. An increased body mass index has been suggested to be important in the pathogenesis of postmenopausal hypertension [22].

Hypertension has been suggested as a major cardiovascular risk factor, which happens to be the leading cause of death in postmenopausal women [4]. Although the precise mechanism responsible for postmenopausal hypertension is still elusive, but various mechanisms have been called to play a role [4]. In the present study, we also observed that hypertension comorbidly occurred with diabetes (21.5%) than obesity (9.4%), suggesting that menopause possibly may affect blood pressure and glucose metabolism more than body fat. Subsequently, such changes may probably lead progressively to some undefined pathophysiological changes in the body function which invariably will affect cardiovascular risk factors such as elevated blood pressure and raised blood glucose. Furthermore, we observed that obesity associated equally with either hypertension (9.4%), diabetes (9.4%), prehypertension (4.5%) or prediabetes (4.5%) concurring with the generalization that obesity is a risk factor for type 2 diabetes and hypertension, and additionally, for prediabetes and prehypertension. Evidently, our observation is also in good agreement with the generalization that the association of elevated blood pressure, raised blood glucose and increased body mass index are positively correlated with cardiovascular events in women. More so, it has been suggested that obesity estimated by the body mass index is not an independent risk factor for cardiovascular diseases in women [25] rather; it is associated with other cardiovascular risk factors which may confound the positive association [26].

Obesity rate has been reported from 24 to 36% in developed nations, and a global estimate of adult obesity of 11% [27]. Current estimates from the Centre for Disease control indicate that approximately one-third of the population in the United States is obese, and another third is overweight [28]. In the present study, the prevalence of overweight was 27.4% and obesity 13.9%. More so, the body mass index of the participants (26.5±9kg/m^2) fall in the range defined as overweight, which is comparable with 25.97kg/m^2 and 25.96±0.53kg/m^2 respectively reported in similar Nigerian studies at Zaria [29] and Calabar [30]. The observation of high prevalence of increased body mass index defined as overweight (BMI 25-29kg/m^2) is in agreement with previous studies (8,19) which suggested that environmental pollution from chronic exposure to oil and gas flares can impair body functions of Nigerians in the Niger delta region.

This present study showed for the first time, though for a small population, a strong relationship

between impact of menopause and ABO and rhesus blood group on the incidence and prevalence of hypertension, type 2 diabetes, obesity combined with prehypertension, prediabetes or overweight, with the participants with the A or AB blood types having a lower risk for developing these diseases. Our study further showed strong relationship between increased body mass index and/or with ABO/Rh blood group prevalence and high blood pressure (hypertension) in postmenopausal women. At present, the link between the associations and the listed variables are unexplained, which requires more detailed research. It is hope that the findings of this study may provide additional help to physicians in cutting-edge medicine.

Conflict of Interest: No conflicts of interest, financial or otherwise, are declared by the authors.

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