

Relation between ABO blood groups and Rh group with hypertension among pregnant women attending antenatal clinic in Baquba- Diyala Province

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Summary:

Background: Several reports show that hypertension is a leading cause of maternal and fetal morbidity; also ABO blood group may be blamed in susceptibility to human diseases as blood-group antigens which influence the bioavailability of E-selectin, TNF-alpha and intra cellular adhesion molecule-1 (ICAM1) factors that implicated in the pathogenesis of preeclampsia.

Objective: To evaluate the possible relationship between ABO blood group and Rh with hypertension in pregnancy.

Patients and method: Case- control study is conducted in Al-Batool teaching hospital for maternity and children in Baquba city. Two hundred and twenty (220) pregnant women with hypertension and 100 normal healthy pregnant women, in specific age group are enrolled . Comparison between hypertension and ABO blood group is done. Statistical analysis is done by X^2 and t- test.

Results: The results reveal that mean age in hypertensive pregnant women is(30.0±6.8), while in healthy control pregnant women is (26.2±6.1) years in all ABO and Rh. blood groups. Mean weeks of gestations in hypertensive pregnant women and healthy control groups are (37.0±3.0), (35.8±6.1) respectively in all ABO and Rh blood groups. Blood group O is the highest percent (41%) in hypertensive pregnant women, (31%) in control group but it was statistically not significant p value (0.239), in control group higher percent found with blood group A (36%) comparing with blood group A in hypertensive group (33%) but also statistically not significant. Among both hypertensive pregnant women and healthy control pregnant women Rhesus positive (Rh +ve) percent is significantly higher in both hypertensive and control group (78%, 85%) respectively than Rhesus negative (Rh -ve) (22%) in hypertensive and (15%) in control, while no significant difference in the percentage of Rh+ve between the hypertensive(78%) and control group(85%) and Rh-ve in hypertensive(22%) and control(15%).

Conclusion: This study reveals no association between ABO and Rh blood group and hypertension in pregnancy.

Key words: Blood group, Hypertension, Pregnancy.

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Introduction:

Hypertension has a complicated consequence in 5% to 7% of all pregnancies, it is a leading cause of maternal and fetal morbidity, particularly, when the elevated blood pressure (BP) is due to preeclampsia either alone (pure) or “superimposed” on chronic vascular disease [1, 2]. Hypertension is defined as levels that are ≥ 140 mm Hg systolic or ≥ 90 mm Hg diastolic (preferably confirmed by two readings 4 to 6 hours apart). Previously, an increase of 15 mm Hg diastolic and 30 mm Hg systolic, respectively, even if the final value $\geq 140/90$ mm Hg is also included in the definition [1,3], BP in pregnancy can be classified into only. Four categories including preeclampsia -eclampsia, chronic hypertension of any cause, preeclampsia are superimposed on chronic hypertension and Gestational hypertension [1]. Pre-eclampsia is an important cause of maternal morbidity and mortality. Its etiology is still unknown. Clinical symptoms correlate with activation of coagulation

and inherited thrombophilia has been associated with pre-eclampsia. Pre-eclampsia is defined as blood pressure higher than 140 mmHg systolic and 90 mmHg diastolic, and proteinuria greater than 300 mg/24 hr occurring after 20 weeks of gestations [2, 4]. Gestational hypertension is characterized by mild to moderate elevation of blood pressure after mid gestation but without abnormal proteinuria, usually near term [1]. The ABO blood group system is the first human blood group system to be discovered. Most geneticists believe that genetic factors are involved in susceptibility and resistance to many ‘non-mendelizing’ human diseases [5]. It seems, therefore, reasonable to look for disease associations among genetic polymorphisms and a great deal of work has already been done with blood groups in this field. The character of the ABO blood groups is exclusively and integrally heritable, genetically determined at conception and remain fixed for life. Hence its frequency distribution follows a known pattern governed by gene transmission from generation to generation and varies with the race and geographical distribution of human being [6]. Also One of the most significant disease associations described for non-O (subjects of group A, B, or

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AB) versus O subjects is susceptibility to arterial and venous thromboembolism (VTE) because they have a greater levels of von Willebrand factor (vWF) and factor VIII. These observations raise the possibility that a greater propensity for blood clot formation in non-O patients conferred a survival advantage to early humans [7], and indeed, blood-group antigens influence the bioavailability of E-selectin, TNF-alpha and ICAM1 factors implicated in the pathogenesis of preeclampsia (4,6). As galectins (Placental Protein 13 (PP13) that binds beta-galactosides, such as N-acetyl-galactosamine, galactose, fucose, located at terminal positions on ABO blood-group antigens) are at the cross-roads of the immune and coagulation systems. Differences in their bioavailability in different blood groups may suggest a role for galectins in the pathophysiologic regulation of these systems [8].

Patients and methods:

A case control study is conducted in Al-Batool teaching hospital for maternity and children in Baquba city from 1st of April- June 2013 .Twenty one pregnant women with more than 20 weeks of gestation with hypertension disorder of pregnancy are selected randomly from the outpatient clinic as cases (twenty patient are excluded because they have secondary hypertension due to other diseases) and 100 healthy pregnant women with more than 20 weeks of gestation are used as a control group.Women included in this study are healthy and hypertensive (chronic or essential hypertension) pregnant women aged 15- 42 years old. After 20 weeks of gestation, women less than 20 weeks of their gestation, hypertensive pregnant women due to other causes renal, cardiac, or connective tissue diseases are excluded. All the blood samples are tested immediately after collection. The principle of ABO grouping is based on a specific agglutination reaction between antigens on the red cells and IgM antibodies in the typing serum .The antisera used for blood grouping in this study are provided by monosera, directed towards respective antigen(s) indicating a positive test result. Absence of agglutination of red cells with monosera indicates a negative test result and therefore absence of corresponding antigen(s). Absence of both A and B blood group antigens are indicative of blood group O (6). The results are shown in tables. All comparisons between hypertensive in ABO blood groups and RH system are statistically analyzed by X² test (Chi square test) and Students-t-test for the difference between two independent means, the results are considered significant at p value ≤ 0.05.

Results:

This study aims to identify the association between blood groups and hypertension in pregnant women. It is carried on 220 pregnant women, out of whom 100 were hypertensive and 100 were healthy control, while the other 20 are excluded because of essential and chronic hypertension. As shown in table (1) mean age ± standard deviation (SD) in hypertensive pregnant women were (30.0±6.8) and the range is (18-45) years in all ABO and Rh blood groups. While in healthy control pregnant

women is (26.2±6.1) and the range is (15-41) years in all ABO and Rh blood groups.

Table 1: Mean age of the pregnant women with hypertension and healthy controls in all ABO and Rh blood groups.

Age (years)	Diseases		Control	
	No.	%	No.	%
<20	7	7.1	11	11.3
20-24	23	23.7	22	22.7
25-29	21	21.6	33	34.0
30-34	22	22.7	17	17.5
=>35years	27	27.8	17	17.4
Mean±SD (Range)	30.0±6.8 (18-45)		26.2±6.1 (15-41)	

SD= Standard deviation

Table (2) shows mean weeks of gestations ± (SD) in hypertensive pregnant women and healthy control groups (37.0±3.0), (35.8±6.1) respectively and the range are (22-40); (20-40) respectively in all ABO and Rh blood groups.

Table 2: Mean weeks of gestations of the pregnant women with hypertension and healthy controls in all ABO and Rh blood groups.

GA(weeks)	Diseases		Control	
	No.	%	No.	%
<28	2	2.1	13	13.4
28-31	4	4.1	1	1.0
32-36	17	17.5	10	10.3
=>37weeks	74	76.3	73	75.3
Mean±SD (Range)	37.0±3.0 (22-40)		35.8±6.1 (20-40)	

SD= Standard deviation

GA= Gestational age

As shown in table (3) although blood group O is the higher percent (41%) in hypertensive pregnant women, and (31%) in control group but it is not statistically significant p value (0.239). Also blood group O has a higher percent among other blood groups in hypertensive pregnant women [A (33%), B (21%), AB (5%)]. In control group, higher percent is found with blood group A (36%) comparing with blood group A in hypertensive group (33%). But also, this is statistically not significant. Also blood group A is higher than other blood groups in the control groups O (31%), B (30%), AB (3%).

Table3: The distribution of hypertensive pregnant women and control group according to their blood groups in the studied group.

Blood groups	No.Patients	%	No.Control	%	P value
A	33	33	36	36	0.239
B	21	21	30	30	
AB	5	5	3	3	
O	41	41	31	31	
Total	100	100	100	100	

Cal X² = 107.216

Df = 3

Tab X²= 7.815

P value= 0.239

Among both hypertensive pregnant women and healthy control pregnant women Rhesus positive (Rh +ve) percent is significantly higher in both hypertensive and control group (78%, 85%) respectively than Rhesus negative (Rh -ve) (22%) in hypertensive and (15%) in control group. While no significant difference in the percentage of Rh+ve between the hypertensive(78%) and control group(85%) and Rh-ve in hypertensive(22%) and control(15%) . Table (4).

Table 4: The distribution of pregnant women with hypertension and control group according to Rh group in the studied groups.

Rh	No.Patient	%	No.Control	%	P value
ve+	78	78	85	85	<0.001(S)
ve-	22	22	15	15	
Total	100	100	100	100	

Cal $X^2 = 103.14$

Df = 1

Tab $X^2 = 3.84$

P value = < 0.001

Figure (1) shows that blood group O+ve has a higher frequency in hypertensive pregnant women than O-ve (31%, 10% respectively) which is significant (p value < 0.05) and in control group O+ve (26%), O-ve (5%) which is also significant. Although O+ve has a higher frequency in hypertensive than in the control pregnant women (31%, 26% respectively) but it is not significant p value (0.239). A+ve has a higher frequency in hypertensive group than A-ve (27%, 6%) and also in control group A+ve (33%), A-ve (3%). All these finding are significant (p value < 0.05), although A+ve in control group is higher than in hypertensive group(33%, 27% respectively) while, A-ve in hypertensive is higher than in the control group (6%, 3%) but statistically not significant (p value 0.239). B+ve (25%) in control group which is higher than in hypertensive group (17%), also B-ve (5%) in control group which is also higher than hypertensive group (4%) which is statistically significant. Yet, there is no significant difference between the frequency of B+ve in hypertensive and control group although in the control group there is a higher frequency than in hypertensive group (17%, 25% respectively). AB+ve is (3%) in hypertensive group and (1%) in control group, AB-ve and (2%) in hypertensive group (2%) in control group. All of these results are statistically not significant (p value 0.239) .

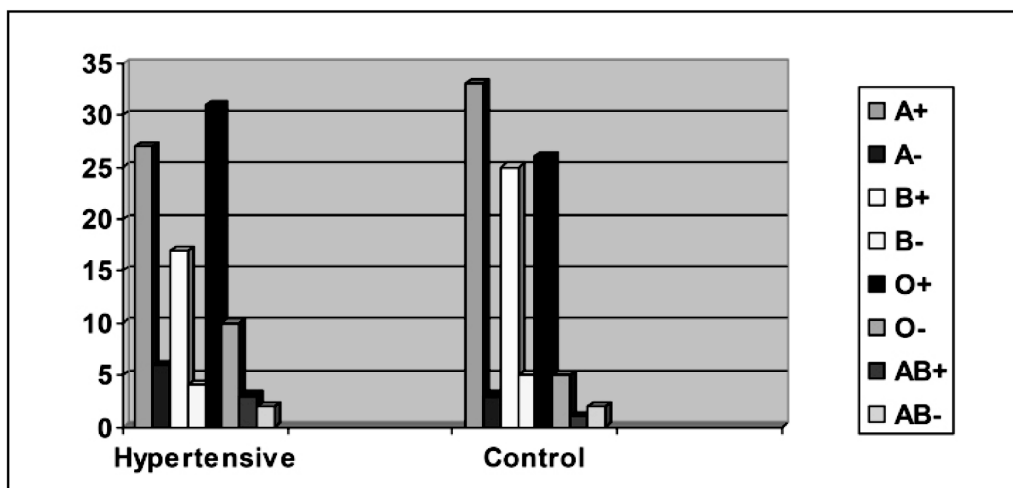


Figure 1: The frequency of distribution of Rh and ABO blood groups in hypertensive and normotensive pregnant women

Discussion:

This study is performed in Al-Batool teaching hospital for maternity and children by choosing sample of healthy and hypertensive pregnant women to see whether it agrees or disagrees with other studies that find association between Rh and ABO blood groups and hypertension [3, 6]. And this may help us to predict who will develop hypertension in pregnancy, depending on the blood groups. The range of age of hypertensive and healthy pregnant women that participate in the study are (18- 45), (15, 41) respectively and the mean age are(30.0± 6.8) and (26.2± 6.1) respectively. Mean weeks of gestation in hypertensive pregnant women is (37.0± 3.0)

and in control group is (35.8±6.1). This may be because a large number of pregnant women do not attend antenatal care clinic until they reach to these weeks of gestation because of the lack of educational programs that explain the benefit of following up pregnant women. Although Blood group O has a higher frequency in Iraqi people (46.7%) comparing with blood groups A and B respectively 30.9%, 22.5% [9]. But blood group O has a higher frequency in hypertensive pregnant women and minimum frequency in AB comparing with healthy pregnant women which had blood group A has a higher frequency than the remaining blood groups but statistically not significant (p value 0.239). This is in agreement

with Nishi, et al., 2012 [6]. Who find that in hypertensive women patient's maximum incidence for the disease is found in blood group O and minimum in group AB but it does not agree with them regarding the significance of these findings as he found that the disease is found to be statistically associated with blood groups. Also this study agrees with Pearson, et al., 1956 [10], Ambareesha, et al., 2012 [3], and Hentschke et al., 2009 [5]. Who find that there is no specific difference between preeclampsia, eclampsia and the controls in the distribution of the blood groups, but the result of the present study disagrees with Phaloprakarn et al., 2013 [11] and Dickins, et al., 1956 [12]. Who find that maternal AB who find that those with blood type AB has the highest values of systolic blood pressure and diastolic blood pressure than other blood group. According to this study, there are higher frequencies of Rh +ve blood group in both hypertensive and control pregnant women than Rh-ve that is considered highly significant (p value <0.001). This is may be related with higher frequency of Rh+ve blood groups in Iraqi people comparing with Rh-ve blood groups [9]. But there is no significant difference between Rh+ve frequency in hypertensive and control group and also between Rh-ve in hypertensive and control group. This is may be related with the small number of the women involved in the sample and because most of them have Rh+ve blood group. This is not in agreement with Maryam et al., 2011 [2] who find that preeclampsia is more common in Rh-ve cases. Also, it does not agree with Ambareesha, et al., 2012 [3]. In Rh+ve individuals maximum incidence is found in blood group O and the minimum is found in blood group AB. In Rh-ve individuals maximum incidence is found in blood group O and minimum in blood group AB. These findings both in hypertensive and control group are statistically not significant. So, this study fails to find the relation between blood group and hypertension. This agrees with Nishi et al., 2012 [6]. In part which finds that in Rh+ve individual's the maximum incidence is found in blood group O and the minimum is found in blood group AB. In Rh-ve individuals maximum incidence is found in blood group O and the minimum in blood group AB, but this does not agree with them in the other part which tells that these findings are in hypertensive group only. So, he says that the disease is found statistically associated with blood groups. Also, it does not agree with Lee et al., 2012 [14] who find that Rh+ve mothers had small increased risk for preeclampsia. And, it does not agree with May, 1973 [15] who finds that O+ve mothers having fewer cases of toxemia and O-ve mothers having more cases of toxemia than expected. We acknowledge several limitations of the study which are firstly, the number of the women involved in the study is small and secondly, to study the association between the ABO and Rh blood groups distribution and hypertension in pregnancy, we need multicenter studies that include not only pregnant women but also not pregnant women in addition to another data that may involve all the population and include all types of hypertension. To conclude, the ABO system and Rh-system is genetically determined and it remains the most important

blood group systems clinically. The results of this study suggest no association between ABO and Rh blood group system and hypertension in pregnancy. Further studies with a sample large in number are needed to confirm the same results and to study the role of other factors in hypertension and pregnancy.

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