

# A report on the association of ABO blood groups with pre-eclampsia.

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**Summary:** Pre-eclampsia is a condition confined to pregnancy and is a leading cause for maternal, fetal and neonatal morbidity and mortality. There are several contradictory reports on the association of ABO blood groups with pre-eclampsia. In the present study 365 pre-eclamptic patients, 330 pregnant controls, 150 normotensive non-pregnant controls and 50 hypertensive controls were analysed for the ABO blood groups and association with pre-eclampsia. A significant association with group A and B was observed suggesting high risk of pre-eclampsia to women with these groups. Multigravid women with recurrence of pre-eclampsia had a high incidence of group A in comparison to women with non recurrence of pre-eclampsia. A high frequency of group B was observed in cases with positive history for pre-eclampsia and essential hypertension as compared to cases with negative history.

Group A individuals are known to be at a higher risk for developing venous thromboembolic disease. The significant association of blood group A with pre-eclampsia as observed in the present study indicates a high risk for these individuals to develop pre-eclampsia, where there is an increase in arterial pressure leading to haemolysis and intravascular coagulation.

## Introduction :

Pre-eclampsia is defined as an onset of hypertension during the third trimester of pregnancy characterised by an increase in arterial blood pressure, presence of proteinuria and edema.

As early as 1905 Dienst's postulated blood group incompatibility between mother and fetus as an aetiological factor in pre-eclampsia. Aird et al (1953) proposed for the first time the concept of association of genetic markers with diseases. There are several reports on the association of blood groups with various diseases the most talked about being the blood group 'O' and peptic ulcer, blood group A and gastric carcinoma etc. There are several contradictory reports on the association of ABO blood groups and pre-eclampsia (Pike & Dickens 1954, Chandravati 1966). So far there are no reports on ABO blood group association and pre-eclampsia from the local population. This paper deals with the relative

risk of individuals with ABO blood groups for pre-eclampsia.

## Material and method :

In the present study the required data and various blood samples were collected from 365 confirmed cases of pre-eclampsia, 330 pregnant controls, 150 normotensive non-pregnant controls from Government Maternity Hospital and Institute of Obstetrics and Gynaecology, Hyderabad along with 50 hypertensive controls from Railway General Hospital, Secunderabad by visiting these hospitals twice a week.

The diagnosis of pre-eclampsia was based on the evaluation of clinical symptoms, blood pressure recording, oedema and laboratory investigations which included estimation of proteinuria, complete blood picture, serum creatinine and serum uric acid levels. Secondary cases were

not included in the study.

From all the patients and controls detailed histories were taken which covered information on age, gestation, gravidity, familial incidence of pre-eclampsia and essential hypertension and incidence of consanguinity in the family.

The ABO blood groups were typed by the method of Bhatia (1972). The results obtained were tested for difference between patients and controls with respect to blood group frequencies. Comparison of the blood group frequencies were also made with respect to severity of pre-eclampsia, gravidity, recurrence of pre-eclampsia in

multi-gravid women and with and without a family history of pre-eclampsia and/or essential hypertension. Relative risk of the phenotypes to pre-eclampsia were estimated by Woolf's method (1955).

### Results and Discussion :

Table-I shows the distribution of ABO Blood groups in patients and controls. There was an increase in the frequency of blood group A in pre-eclamptic cases (25.2%) in comparison to pregnant controls (20.3%), non-pregnant controls (18.7%) and hypertensive controls (14%). A similar trend was observed with group B. Estimation of relative incidence revealed a significant association with

**Table - 1:**  
**Distribution of ABO Blood groups in pre-eclampsia, subgroups of pre-eclampsia and controls**

	A		B		O		AB		Total
	n	%	n	%	n	%	n	%	
Pre-eclampsia	92	25.2	124	33.9	132	36.2	17	4.7	365
Mild	36	22.9	51	32.5	62	39.5	8	5.1	157
Moderate	35	27.1	45	34.9	44	34.1	5	3.9	129
Severe	21	26.6	28	35.4	26	32.9	4	5.1	79
Primigravida	38	23.5	60	37.0	53	32.7	11	6.8	162
Multigravida	48	23.6	69	33.9	80	39.4	6	2.9	203
Recurrence of PE	20	30.7	20	30.7	24	36.9	1	1.5	65
Non-Recurrence of PE	66	22.0	109	36.3	109	36.3	16	5.3	300
Familial PE	5	15.2	16	48.5	12	36.4	17	5.1	332
Familial EHT	10	23.8	19	45.2	9	21.4	4	9.5	42
Non-Familial EHT	82	25.4	105	32.5	123	38.1	13	4.0	323
<b>Controls</b>									
Pregnant controls	67	20.3	90	27.3	156	47.3	17	5.2	330
Primi	16	16.8	27	28.4	47	49.5	5	5.3	95
Multi	52	22.1	64	27.2	107	45.5	12	5.1	235
Non-pregnant controls	28	18.7	36	24.0	80	53.3	6	4.0	150
Hypertensive controls	7	14.0	11	22.0	28	56.0	4	8.0	50

PE = Pre-eclampsia, EHT = Essential hypertension.

**Table - II**  
**Relative risk of individuals with ABO blood groups for pre-eclampsia**

	PE Vs Pc		PE Vs PC&NPC		PE Vs HC		HC Vs PC&NPC		Recurrence Vs Non-recurrence		Familial PE Vs Non Familial PE		Familial EHT Vs Non familial EHT	
	RR	X <sup>2</sup>	RR	X <sup>2</sup>	RR	X <sup>2</sup>	RR	X <sup>2</sup>	RR	X <sup>2</sup>	RR	X <sup>2</sup>	RR	X <sup>2</sup>
Blood Groups														
A Vs O	1.60	6.98**	1.73	9.50*	2.79	5.35*	0.47	1.13	1.38	0.89	1.87	2.28	1.75	1.35
B Vs O	1.60	6.98**	1.76	9.70	2.39	5.29*	0.14	0.68	0.83	0.30	1.43	0.83	2.30	3.89*
A Vs B	0.90	0.00	0.98	0.007	1.17	0.09	0.84	0.12	1.65	2.02	1.31	0.19	0.76	0.42
O Vs Others	0.63	8.82*	0.59	12.80*	0.45	7.05*	1.30	0.74	1.03	0.01	0.67	1.24	0.45	4.08*

8 = P < 0.05 PC = Pregnant Control, NPC = Non Pregnant Control, HC=Hypertensive Control PE = Pre-eclampsia EHT = Essential Hypertension.

blood group A and B in comparison to group O suggesting higher risk of pre-eclampsia, to women with these groups. In general there was an increase in blood groups A and B with a corresponding decrease of group O. When the severity of the disease was considered there was a slight increase in blood group A in moderate (27.1%) and severe (26.6%) types in comparison to mild (22.9%) types whereas there was an increase of blood group B in severe type (35.4%) in comparison to mild (32.5%) and moderate (34.9%) types.

The distribution of blood groups with respect to gravidity showed no variation in blood group A between primi and multigravid women within pre-eclampsia. When Primi-gravid patients were considered, pre-eclamptic primi had a higher frequency of blood group A (23.5%) and group B (37.0%) in comparison to pregnant controls with group A (16.8%) and group B (28.4%). While group O had reduced frequency (32.7%; 39.4%) in pre-eclampsia as compared to pregnant control (49.5%, 45.5%) in primi and multigravid cases respectively.

Multigravid women with recurrence of pre-eclampsia revealed a high incidence of group A (26.7%) with a corresponding decrease in group B (30.4%) in comparison

to non-recurrent cases of pre-eclampsia (group A 22.0%, group B-36.3%).

The blood group distribution in patients with respect to positive history of pre-eclampsia and essential hypertension revealed an increase in the frequency of group B (48.5% and 45.2% respectively) as compared to those with negative history (PE-34.0% and EHT-34.1%). Correspondingly there was a reduction in group A patients with familial pre-eclampsia (15.2%) and in group O with familial essential hypertension (21.4%).

The significant association of blood group A with pre-eclampsia as observed in the present study is in accordance with the earlier reports of Krauss and Dedek (1978). Group A individuals are known to be at higher risk for developing venous thromboembolic disease associated with pregnancy (Mourant et al 1978). Therefore individuals with group A are likely to be more susceptible to conditions like pre-eclampsia and essential hypertension where there is increase in arterial pressure leading to intravascular coagulation. Earlier studies from our lab revealed a high risk for group A individuals to essential hypertension.

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