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# Study of maternal blood groups and gestational hypertensive disorders

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**Abstract**
Being many research works are going on, how pregnancy aggravates hypertension remains unsolved. Hypertensive disorders remain among the most significant and interesting unresolved issues in obstetrics. Preeclampsia is also considered as a cardiovascular disease risk factor and many studies have shown preeclampsia increases the prevalence of various cardiovascular risk factors, such as hypertension, insulin resistance, metabolic syndrome, micro albuminuria and endothelial dysfunction. In this study, we aimed to study about any possible relationship between the ABO/Rh blood group system and hypertensive disorders in pregnant women.
**Materials & Methods:** A retrospective study was carried out 8182 pregnant women who camefor safe confinement during a period of one year from January 2019 to December 2019 in department of Obstetrics and Gynecology in a tertiary care center, Maharashtra. All the cases were analyzed for ABO blood group & Rh typing, systolic and diastolic blood pressure were monitored and correlated for each other.
**Result:** The frequency of ABO blood groups in hypertensive cases was found to be
B & Gt; O & Gt; A & gt; AB. Rh typing was positive is more common. The prevalence of blood group B found to be increased in hypertensive group by 36.29%, prevalence of blood group O, A and AB was found to 27.27%, 20.29% and 10.67% respectively.
**Conclusion:** Blood group B POSITIVE was more susceptible to hypertensive disorders in pregnancy.

**Keywords:** ABO blood groups, hypertensive disorders of pregnancy, thrombin, two stage theory.

## 1. Introduction

**1.1** Hypertensive disorder of pregnancy is diagnosed when appropriately taken blood pressure exceeds 140 mm Hg systolic or 90 mm Hg diastolic after 20 weeks of gestational age. The American College of Obstetricians and Gynecologists (2013b) has classified four types of hypertensive disease in pregnancy,
1. Gestational hypertension
2. Preeclampsia and eclampsia syndrome
3. Chronic hypertension of any etiology
4. Preeclampsia superimposed on chronic hypertension

**1.2.** Of all pregnancies, hypertensive disorders complicate nearly 5 to 10 % and it leads to form deadly triad along with hemorrhage and infection that contributes increase in maternal morbidity and mortality [1]. Of these disorder, the most dangerous is the preeclampsia syndrome, either alone or superimposed on chronic hypertension. Gestational hypertension is the term used to define newly onset of hypertension during pregnancy and is followed by signs and symptoms of preeclampsia almost in half the time, and preeclampsia is prevalent in 3.9 percent of all pregnancies [2].

**1.3.** The World Health Organization (WHO) systematically reviews maternal mortality worldwide, and in developed countries based on many studies reported, 16 percent of maternal deaths were reported to be due to hypertensive disorders [3] which is greater than three other leading causes such as hemorrhage 13%, abortion 8%, and sepsis 2 %.

**1.4.** The etiology of the disease is unknown, but recent studies have revealed that this disorder appears due to originate in placenta and which is characterized by widespread endothelial dysfunction [4]. High-risk groups include previous history of gestational hypertensive disorders, those at either end of the reproductive age spectrum, black ethnicity, obesity, multiple pregnancy, primi parity and preexisting medical conditions such as insulin-dependent diabetes, renal disease, antiphospholipid syndrome and autoimmune disease [5].

**1.5.** The ABO blood group system was first discovered by Karl Landsteiner in 1900 when he was searching for the reason why some blood transfusions were successful while others could be worsen resulting in deadly complications. The blood group of a person is based upon the two genes, A and B. The gene that determines human blood type is located on chromosome 9 and is so called ABO glycosyltransferase [6]. Immunological characteristics determine and classify the differentiation of blood by type [7]. Studies have shown that various blood group phenotypes have been implicated in increased susceptibility to certain diseases [8] like Helicobacter pylori infection and increased risk of peptic ulcer [9, 10], hemolytic uremic syndrome and Escherichia coli infection [11], Vibrio cholera [12], neoplasm [13] and infertility [14]. Its frequency distribution results a known pattern by gene transmission, and variable with the race and geographical distribution of human beings [15].

**1.6.** The relationship between ABO/Rh blood groups and hypertensive disorder of pregnancy has been observed in many studies for years, which resulted in inconclusive findings. In this study, we aimed to investigate any possible relationship between the ABO/Rh blood group system and hypertensive disorders of pregnancy.

## 2. Objectives

To enumerate the distribution of ABO blood groups in hypertensive disorder of pregnancy and to analyze whether blood group can be a risk factor for hypertensive disorders of pregnancy.

## 3. Materials and methods

Retrospective observational study on 8182 pregnant women who came for safe confinement during a period of one year from January 2019 to December 2019 in department of Obstetrics and Gynecology in a tertiary care center, Maharashtra. All the hypertensive pregnant cases were categorized for ABO blood group & Rh typing. We included all pregnant patient with blood pressure more than or equal to 140/90mmHg who came for safe confinement. They were categorized as non-severe and severe gestational hypertensive disorder based on criteria described in reference book Williams's textbook of Obstetrics [1]. Non severe preeclampsia is categorized when BP 140-160/90-110 mmHg, proteinuria none to positive, with minimal serum transaminases increased and no premonitory symptoms. Severe preeclampsia is categoried when BP >160/110mmHg, proteinuria none to positive with marked elevated liver enzymes, pre monitory symptoms, fetal growth restriction and pulmonary edema and patient who has convulsion. This study is designed and analyzed based on data that was collected from the patient's records in our hospital. The ethical committee of the institute had approved the study. Results were analyzed by using percentage and discussed in details.

## 4. Results

**4.1** During the period of one year, there were 8182 deliveries in our hospital of which 5127 cases were vaginal deliveries and 3055 were cesarean sections. There were 6088 patients (74.40%) were normotensive and 2094 were gestational hypertensive patients contributing 25.59% of prevalence. (Table no. 1)

**Table 1:** Total no. of patients

| Category | No. of Patients (n= 8182) | Percentage (%) |
|---|---|---|
| Normotensive | 6088 | 74.41 |
| Gestational hypertensive disorder | 2094 | 25.59 |

**4.2** Out of 2094 gestational hypertensive patients, 1237 cases were non severe gestational hypertension and 857 were severe gestational hypertension contributing 59.09% and 40.90% respectively. (Table no. 2)

**Table 2:** Non severe vs severe gestational hypertension

| Severity of gestational hypertension | No. of Patients (n= 2094) | Percentage (%) |
|---|---|---|
| Non severe | 1237 | 59.09 |
| Severe | 857 | 40.91 |

**4.3** The blood group O positive was more commonly prevalent in our hospital in 2622 cases and followed by blood group B, A and AB in 2498, 1818 and 862 cases respectively. Blood group distribution in gestational hypertensive disorder commonly by B positive in 760 patients and followed by O, A and AB in 571,436 and 224 cases respectively. Rh positive is more common than Rh negative. (Table no. 3)

**Table 3:** Blood group distribution

| Blood group | Normotensive | Percent% | Non- severe gestational hypertension | Percent% | Severe gestational hypertension | Percent% |
|---|---|---|---|---|---|---|
| O Positive | 2051 | 33.69 | 360 | 29.10 | 211 | 24.62 |
| B Positive | 1738 | 28.55 | 399 | 32.26 | 361 | 42.12 |
| A Positive | 1382 | 22.70 | 291 | 23.52 | 145 | 16.92 |
| AB Positive | 638 | 10.48 | 120 | 9.70 | 104 | 12.14 |
| O Negative | 101 | 1.66 | 9 | 0.73 | 17 | 1.98 |
| B Negative | 81 | 1.33 | 45 | 3.64 | 12 | 1.40 |
| A Negative | 64 | 1.05 | 4 | 0.32 | 6 | 0.70 |
| AB Negative | 33 | 0.54 | 9 | 0.73 | 1 | 0.17 |
| Total | 6088 | 100 | 1237 | 100 | 857 | 100 |

## 5. Discussion

**5.1** Hypertensive disorders of pregnancy are a major maternal health problem in India, rapidly increasing in both urban and rural populations. Majority of hypertensive subjects remain undetected as its initial asymptomatic course, and thus its control is inadequate. It is estimated that the prevalence of pre eclampsia globally is 4.6 % [16].

**5.2** Many studies have done regarding risk factors associated with development for hypertension disorders in pregnancy. Some studies resulted that there is no relation between ABO blood group and hypertensive disorders of pregnancy [17, 18 & 19]. Many studies reported that blood group B has risk for developing hypertension [20, 21]. Study has done by Dr. Kermes *et al*. reported that blood group B carriers showed the highest thrombin generating capacity compared to other ABO blood groups and this group also has the highest plasma FVIII level [22]. The recently proposed hypothesis of a two-stage disorder in the pathogenesis of PE has become widely accepted. Dr. Motoi Sugimura in his study elaborated that the generation of thrombin by procoagulant factors derived from the placenta, maternal prothrombotic background is part of the two stage disorder theory for the pathogenesis of preeclampsia [23].

**5.3:** The study regarding blood group prevalence by Agrawal A *et al.* [24] showed that O was the most common blood group (37.12%) secondly by B at 32.26%, thirdly by A group at 22.88% and the least common by AB group at 7.74%. Among the donor population, Rh positive prevalent more than Rh negative. According to the Hardy Weinberg law of Equilibrium, the calculated gene frequencies are 0.1653, 0.2254 and 0.6093 for $I^A$, $I^B$ and $I^O$ respectively. In Indian population, Blood group O records the highest value followed by B and A. From the table no.3 As resulted in the same frequency in our study with O blood group the most common followed by group B, A and then AB. Hypertensive disorders of pregnancy are mostly prevalent among blood group B (36.29%) contributing non severe pre eclampsia as 32.26% and severe pre eclampsia as 42.12%. Secondly prevalent in blood group O in 27.27% contributing non severe pre eclampsia as 29.10% and severe pre eclampsia in 24.62%. Rh D positive is more prevalent than negative. Least cases of hypertensive disorders of pregnancy prevalent in blood group AB Negative.

## 6. Conclusion

Maternal mortality is known general indicator of the overall functioning of the health system. Pregnancy, the most awaiting moment for all women's life and most of the time their deliveries are not uneventful. Hypertensive disorders in pregnancy directly or indirectly endangers her life. To diagnose a case as hypertensive we can't totally depend on cutoff BP more than 140/90mmHg because some patient's baseline BP may be even below the normal range. So any pregnant woman during her regular ANC visit is presenting with clinical picture of hypertensive or borderline raised BP and those blood group B whom we can prevent further deadly complications by advising them with prophylactic low dose aspirin intake, increased frequency of ANC visits. So that they can be prevented from hypertensive disorder of pregnancy or timely diagnosed with the disease for further less complications.

## 7. References


1. Cunningham, Gray F. Williams obstetrics. Edn 24:chapter40. McGraw –Hill ducation /Medial New York: 2014.Pageno.728
2. Martin JN Jr, Owens My, Keiser SD *et al.* Standardized Mississippi protocol treatment of 190 patients with HELLP syndrome: slowing disease progres- sion and preventing new major maternal morbidity. Hypertens Pregnancy 2012;31(1):79.
3. Khan KS, Wojdyla D, Say L *et al*. WHO analysis of causes of maternal death: A systematic review. Lancet 2006;367:1066.
4. Petla LT, Chikkala R, Ratnakar KS, Kodati V, Sritharan V. Biomarkers for the management of pre-eclampsia in pregnant women. Indian J Med Res 2013;138(1):60-67.
5. Williams PJ, Pipkin FB. The genetics of pre-eclampsia and other hypertensive disorders of pregnancy. Best Pract Res Clin Obset Gynaecol 2011;25(4-4):405-417.
6. Farhud DD, Yeganeh MZ. A brief history of human blood groups. Iran J Public Health 2013;42(1):1-6.
7. Morgan WT, Watkins WM. Unravelling the biochemical basis of blood group ABO and Lewis antigenic specificity. Glycoconj J 2000;17(7-9):501-30.
8. Blackwell CC. The role of ABO blood groups and secretor status in host defenses. FEMS Microbiolimmunol 1989;47(6-7):341-9.
9. Alkout AM, Blackwell CC, Weir DM, Poxton IR, Elton RA, Luman W *et al.* Isolation of a cell surface component of Helicobacter pylori that binds H type 2, Lewis(a), and Lewis(b) antigens. Gastroenterology 1997;112(4):1179-87.
10. Alkout AM, Blackwell CC, Weir DM. Increased inflammatory responses of persons of blood group O to Helicobacter pylori. J Infect Dis 2000;181(4):1364-9.
11. Blackwell CC, Dundas S, James VS, Mackenzie DA, Braun JM, Alkout AM *et al.* Blood group and susceptibility to disease by Escherichia coli O157. J Infect Dis 2002;185(3):393-6.
12. Swerdlow DL, Mintz ED, Rodriguez M, Tejada E, Ocampo C, Espejo L *et al*. Severe life threatening cholera associated with blood group O in Peru: implications for the Latin American epidemic. J Infect Dis 1994;170(2):468-72.
13. Su M, Lu SM, Tian DP, Zhao H, Li XY, Li DR *et al*. Relationship between ABO blood groups and carcinoma of esophageus and cardia in Chaoshan inhabitants of China. World J Gastroenterol 2001;7(5):657-61.
14. Lurie S, Sigler E, Weissman A, Rabinerson D, Barash A. Association of the Lewis blood-group phenotype with infertility in women. Int J Fertil Women Med 1998;43(3):155-8.
15. Mourant AE, Kopec AC, Domaniewska-Sobczak K. Blood Groups and Diseases. Oxford: Oxford University Press 1978.
16. Abalos E, Cuesta C, Grosso AL, Chou D, Say L. Global and regional estimates of preeclampsia and eclampsia: a systematic review. Eur J Obstet Gynecol Reprod Biol 2013;170(1):1-7.
17. Mukhtar IG, Yakubu AA, Yakasai BW, Ahmed SI, Mansur S. Relationship between ABO blood group phenotypes and hypertensive disorders of pregnancy: A hospital-based cross-sectional study in Kano, North-West Nigeria. N Niger J Clin Res 2019;8:68-74.
18. Hentschke MR, Caruso FB, Paulo LG *et al.* Distribution of ABO and rhesus blood groups in patients with pre-eclampsia. Pregnancy Hypertens 2012;2(3):268-269.
19. Hentschke MR, Caruso FB, Paulo LG *et al*. Is there any relationship between ABO/Rh blood group and patients with pre-eclampsia? Pregnancy Hypertens 2014;4(2):170-173.
20. Dr. Heena Sadiq, Dr. Rubeena Anjum, Dr. Shahid Masood Shaikh, Dr. Saleeta Mushtaq, Dr. Monika Negi *et al.* A study on the correlation of ABO blood group system and hypertension. International Journal of Applied Dental Sciences 2017;3(4):38-4.
21. Manjeet Kaur, Kawalpreet Gill, Roopam Bassi, Deepinder Kaur. Association of ABO and Rh blood groups with hypertension. Pak J Physiol 2016;12(2):11-4.

22. Kremers RM, Mohamed AB, Pelkmans L *et al.* Thrombin generating capacity and Phenotypic Association in ABO Blood Groups. PLoS One 2015;10(10):e0141491. Published 2015 Oct 28. doi.10.1371/journal.pone.0141491.
23. Motoi Sugimura. Is thrombin a "toxin" in the pathogenesis of pre eclampsia? Japan Society for the study of hypertension in pregnancy 2015;3(1):13-18.
24. Agrawal A, Tiwari AK, Mehta N, Bhattacharya P, Wankhede R, Tulsiani S *et al.* ABO and Rh (D) group distribution and gene frequency; the first multicentric study in India. Asian J Transfus Sci 2014;8:121-5.