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# Relationship between Maternal ABO Blood group and pregnancy complications of adichunchanagiri hospital B.G Nagara -A cross sectional study

**Malini M[1]*, Meghana CR[1], Amita K[1], Smitha N[1]**

[1]*Dept. of Physiology, Adichunchanagiri Institute of Medical Sciences, B.G Nagara, Mandya, Karnataka, India*

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ABSTRACT

**Background:** ABO blood group has been divulged as a risk factor for perceptible diseased states. The ABO blood group differences may put a patient at specific risk according to their inherited antigens among the obstetrical syndromes like Intrauterine growth restriction, Pre-eclampsia and pre-term labour. Studies conducted have shown Group O individuals had lowest plasma von Willebrand factor and non O group had elevated level of this factor which showed increased thrombotic risk among these individuals. The earlier studies conducted have focused only on preeclampsia but not on other complications of pregnancy and the data available is scarce. The study aims to determine whether maternal ABO blood groups contribute to adverse pregnancy outcomes especially in this part of the country.

**Materials and Methods:** The study was conducted on 50 pregnant women who were having complications of pregnancy including preeclampsia (PE), cases of Pregnancy induced hypertension (PIH), Gestational Diabetes mellitus (GDM) were considered as study cases and 50 pregnant women with normal pregnancy without any complications were categorized as controls. The study was conducted for a period of 6 months among patients attending Obstetrics and Gynecology department of Adichunchanagiri hospital selected based on convenience sampling procedure. Maternal ABO Blood group of the subjects were determined by Haemagglutination technique.

**Results:** Relationship between maternal ABO Blood group and Pregnancy complications (PE, PIH.GDM) was estimated by calculating odds ratio from logistic regression models using Blood Group O as a reference group and p – value of $< 0.05$ was considered as statistically significant. The results of the present study have found that maternal AB blood group was highest among preeclampsia and PIH category of cases.

**Conclusion:** The present study conducted have found maternal AB blood group was highest among PIH and preeclampsia category of cases**.** From the study conducted we want to conclude non-O blood group had the highest risk compared to O Blood group among pregnancy complications.



## 1. Introduction

The antigens of ABO Blood group have been discovered centuries ago as it is expressed on the surface of wider range of human cells and tissues. The presence of two genes A and B determines the ABO blood group of a person. Both A and B alleles encrypts slightly different version of enzymes glycosyltransferase that produce both A and B antigens. The antigens exist in distinct cell and tissues which includes red blood cells, vascular endothelium, epidermis, platelets and neurons. Due to this wider range of expression, ABO blood group constitutes a plot of research outside the area of transfusion and transplantation medicine and also includes the area of reproductive medicine.[1]

ABO blood groups also have shown perceptibility to certain diseases. The ABO blood group differences may put

* *Corresponding author*.
*E-mail address*: dr.malinihassan@gmail.com (Malini M).

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a patient at specific risk according to their inherited antigens among the obstetrical syndromes like Intra uterine growth restriction, Pre-eclampsia, pre-term labour.[2]

Von Will brand factor is a larger category of glycoprotein which is synthesized by endothelial cells and megakaryocytic. The major function of vWF is Hemostasis, deficiency of vWF leads to hemorrhagic disorders, while its elevated levels are at risk factor for thrombosis. Previous studies conducted have shown Group O individuals had lowest plasma vWF levels and non O groups (A, B and AB) had elevated plasma level of this factor which showed increased thrombotic risk among the non O group individuals.[3]

Blood group O individuals having low to moderate plasma concentration of these glycoprotein's, while elevated plasma concentration may be the cause for excessive bleeding among non-group individuals. Circulating levels of anti- hemophilic factor A (factor VIII) plays an important role in temporary hemostatic plug formation and definitive clot formation. Deficiency of vWF leads to hemorrhagic disorders and its elevated levels are risk factor for thrombosis. Some researcher stated that other genes like gene locus of ABO blood group on the chromosome have influence on the vWF gene. Platelets and Blood vessels contain vWF which helps in platelet adhesion and aggregation.[4]

Diseases among certain individuals are more common with one blood type or another like duodenal ulcer, gastric carcinoma, Diabetes mellitus, urinary tract infection and venous thrombosis have shown association with ABO blood group.[5]

Scarcity of published clinical data is present on relationship between maternal ABO blood group and risk of developing pregnancy complications. Hence present study was conducted to determine the maternal ABO blood group of the cases and control selected and to determine the relationship between maternal ABO blood group and pregnancy complications especially in this part of the country

## 2. Objectives

1. To identify the maternal ABO blood group of woman with normal pregnancy and with pregnancy complications (GDM, PE, PIH).
2. To determine the relationship between the maternal ABO blood group and the Pregnancy complications (GDM, PE, PIH).

## 3. Materials and Methods

The present study was conducted at Adichunchanagiri Hospital, Adichunchanagiri Institute of Medical Sciences, B.G Nagara after obtaining Ethical committee clearance from Institutional Ethical Committee (IEC), AIMS, Adichunchanagiri University.

The study was conducted for a period of 6 months duration from October 2019 to April 2020 among patients attending Obstetrics and Gynecology department of the hospital AIMS, B, G Nagara, selected based on convenience sampling procedure.

An informed consent was taken from all subjects after explaining the study procedure. The study subjects were selected from the out-patient and in–patient department of obstetrics and Gynecology and also from labour room of the department. The study was conducted on 50 pregnant women who were having complications of pregnancy including preeclampsia (PE), cases of Pregnancy induced hypertension (PIH), Gestational Diabetes mellitus (GDM) were considered as study cases and 50 pregnant women with normal pregnancy without any complications were categorized as controls. Brief History, Relevant past and personal History from the subjects were taken. General physical examination, vitals of the subject were recorded. Maternal ABO Blood group of the study subjects were determined by Haemagglutination technique. A drop of blood was taken from their fingertip using pricking gun under strict aseptic precaution. 1 drop of blood was mixed with 1 ml of normal saline in a test tube. This provided the red cell suspension, Blood group of the subject was determined by Haemagglutination technique. A drop of monoclonal Anti -A, Anti- B, Anti- D was added separately on a clean glass slide and to each of this a drop of red cell suspension was added. By using separate applicator serum was mixed well back and forth and observed for the presence of agglutination and will be confirmed under low power objective of the microscope.

## 4. Inclusion criteria

1. The pregnant women who were fulfilling the criteria for PIH, PE, GDM.
2. Complications of Pregnancy including pre-eclampsia and related disorders.
3. Rh positive Pregnant females.

### *4.1. Exclusion criteria*

1. Subjects having any other medical or surgical complications.
2. Rh Negative blood group.
3. Subjects with History of smoking.
4. Hemolytic Disease of Newborn.
5. Multiple Pregnancy.
6. H/o of Drugs intake.

### *4.2. Statistical analysis*

The data obtained were analyzed by using Microsoft Excel and statistical package of social Sciences (SPSS version 20.0). The relationship of maternal ABO blood group with

PIH, PE, GDM were estimated by calculating odds ratio from logistic regression models using Blood Group O as a reference group and p – value of < 0.05 was considered as statistically significant.

## 5. Results

Relationship between maternal ABO blood group and Pregnancy complications (PE, PIH.GDM) was estimated by calculating odds ratio from logistic regression models using Blood Group O as a reference group and p – value of < 0.05 was considered as statistically significant. The results of the present study have found that maternal AB blood group was highest among preeclampsia and PIH category of cases.

The data obtained from cases and controls were analyzed. The present study we have observed that the distribution of maternal blood group AB and O was highest among cases studied. The distribution of maternal Blood Group O was highest among the controls studied. The Present study conducted among different cases categories have found that maternal AB blood was highest among GDM cases category but not statistically significant, AB blood group was highest among PIH and preeclampsia category of cases**.** From the present study conducted we want to conclude maternal non-O blood group has the highest risk compared to O Blood group among pregnancy complications. The Relationship between maternal ABO blood group with GDM, PIH, PE category of cases was estimated using odds ratios and 95% confidence intervals from logistical regression models. These results have shown non –O blood groups (A, B, AB) had highest risk among PE category of cases, AB blood group had highest risk among PIH cases category and AB blood group had highest risk among GDM category cases but not statistically significant.

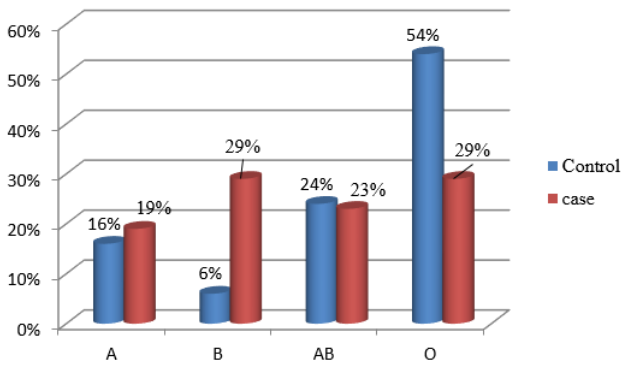


**Figure 1:** Maternal ABO blood group distribution among cases and controls

## 6. Discussion

This cross-sectional study was conducted at department of obstetrics and Gynecology of Adichunchanagiri Hospital after obtaining ethical clearance from the institutional ethical committee, Adichunchanagiri Institute of Medical Sciences.

The study was conducted on 50 pregnant women who were having complications of pregnancy including preeclampsia (PE), cases of Pregnancy induced hypertension (PIH), Gestational Diabetes mellitus (GDM) were considered as study cases and 50 pregnant women with normal pregnancy without any complications were categorized as controls. The study was conducted for a period of 6 months duration from October 2019 to April 2020 among patients attending Obstetrics and Gynecology department of the hospital AIMS, B, G Nagara, selected based on convenience sampling procedure.

The present study we have observed that the distribution of maternal blood group AB and O was highest among cases studied. The distribution of maternal Blood Group O was highest among the controls studied. The Present study conducted among different cases categories (PIH, PE, GDM) have found that maternal AB blood was highest among GDM cases category but not statistically significant, AB blood group was highest among PIH and preeclampsia category of cases**.** These results have shown maternal non -O blood groups (A, B, AB) had highest risk among PE category of cases, maternal AB blood group had highest risk among PIH cases category and AB blood group had highest risk among GDM category cases but not statistically significant. The prevalence of O blood group was 29% among the cases and 54 % among the control group. This may suggest heterogeneity in the ethnic background among the study participants in this geographic area. The results of present data indicated that O blood type may exert some safeguarding effects against development of pregnancy complications compared with non- O blood type. Von willebrand concentration was higher among non – O blood group and has higher risk of development of thrombosis. Blood type AB is associated with highest vWF.[6]

Also influence of ABO antigens on circulating levels of E-selectin, P-selectin, tumor necrosis factor –alpha, soluble intercellular adhesion molecule -1 and interleukin -6 have observed relationship between these biomarkers and insulin resistance and the development of Diabetes mellitus.[7]

Maternal immune response may be accountable for the influence of the maternal blood group on the risk of PIH. Placental protein 13 is considered to be an early marker for preeclampsia and ABO blood group can influence its bioavailability. Differential binding of PP13 to ABO blood group antigens has been noticed which may be due to the close proximity of A and B antigens leading to their sequestration and lowering their serum concentration in first trimester.[8]

Present study is similar to study done by Phaloprakaran C et al have found no significant association between ABO blood group and risk of developing pregnancy

**Table 1:** Maternal ABO blood group distribution among cases

| Cases | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| A | 19 | 19.0 | 19.0 | 19.0 |
| AB | 29 | 29.0 | 29.0 | 48.0 |
| B | 23 | 23.0 | 23.0 | 71.0 |
| O | 29 | 29.0 | 29.0 | 100.0 |
| Total | 100 | 100.0 | 100.0 | |

**Table 2:** Maternal ABO blood group distribution among controls.

| Control | Frequency | Percent | Valid Percent | Cumulative percent |
|---|---|---|---|---|
| A | 16 | 16.0 | 16.0 | 16.0 |
| AB | 6 | 6.0 | 6.0 | 22.0 |
| B | 24 | 24.0 | 24.0 | 46.0 |
| O | 54 | 54.0 | 54.0 | 100.0 |
| Total | 100 | 100.0 | 100.0 | |

**Table 3:** Maternal ABO blood group distribution among PIH, PE, GDM

| Complications of Pregnancy | | Blood groups | | | | Total |
|---|---|---|---|---|---|---|
| | | A | B | AB | O | |
| GDM | No of cases | 5 | 1 | 7 | 6 | 19 |
| | % of cases | 26.3 | 5.3 | 36.8 | 31.6 | 100.0 |
| PE | No of cases | 8 | 2 | 9 | 8 | 27.0 |
| | % of cases | 29.6 | 57.4 | 33.3 | 29.6 | 100 |
| PIH | No of cases | 6 | 26 | 7 | 15 | 54 |
| | % of cases | 11.1 | 48.1 | 13.0 | 27.8 | 100 |

**Table 4:** Relationship between maternal ABO blood group and PIH, PE, GDM

| Complications of pregnancy | | Odds ratio | 95% confidence Interval | | Significance P – Value < 0.05 | |
|---|---|---|---|---|---|---|
| | | | Lower Bound | Upper bound | | |
| GDM | A | 1.83 | 0.4499 | 4.0512 | 0.8 | NS |
| | B | 1.03 | 0.2438 | 4.4113 | 0.9 | NS |
| | AB | 1.50 | 0.15336 | 14.6485 | 0.7 | NS |
| PIH | A | 1.35 | 0.4499 | 4.0512 | 0.6 | NS |
| | B | 1.05 | 0.3794 | 2.9057 | 0.9 | NS |
| | AB | 15.60 | 5.4260 | 44.850 | 0.001 | S |
| PE | A | 3.37 | 1.0928 | 10.4235 | 0.03 | S |
| | B | 2.53 | 0.8709 | 7.3566 | 0.08 | S |
| | AB | 29.25 | 9.1942 | 93.0547 | 0.01 | S |

complications.[9]

The present study is similar to study done by Vinod et al. where they have found an association between maternal ABO blood groups and risk of PIH with results suggesting that woman with AB blood group are at highest risk.[2]

The present study is similar to study done by Manjunath et al. which showed AB blood group had the highest risk of developing preeclampsia. AB blood group is associated with an increased risk of thrombotic events which may cause increased incidence of PIH in this group.[10]

The present study is similar to study done by Premalata Mital et al. have observed AB blood group is at highest risk among PIH cases category.[5]

From the present study conducted we want to conclude maternal non-O blood group has the highest risk compared to O Blood group among pregnancy complications.

Hence to prevent the pregnancy complications, maternal ABO blood grouping of pregnant woman should be done in first trimester and special attention should be given to woman with AB (non- O blood groups).[11]

## 7. Conclusion

The present study conducted have found that maternal AB blood was highest among GDM cases category but not statistically significant. Maternal AB blood group was highest among PIH and preeclampsia category of cases**.** From the study conducted we want to conclude non-O blood group has the highest risk compared to O Blood group among pregnancy complications studied. Non – O blood

groups have elevated level of plasma von willebrand Factor which leads to increased risk of thrombosis**.**

## 8. Conflicts of Interests

No conflicts of interests were disclosed.

## 9. Source of Funding

None.

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## Author biography

**Malini M,** Assistant Professor https://orcid.org/0000-0003-2490-1017

**Meghana CR,** Final Year MBBS Student

**Amita K,** Professor https://orcid.org/0000-0003-2005-7111

**Smitha N,** Assistant Professor

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