

Is there a relationship between maternal blood type and the incidence of gestational diabetes mellitus?

A retrospective review

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Summary

Background: Gestational diabetes mellitus (GDM) is a widely common condition that is defined as glucose intolerance of relatively different degrees, and it affects pregnant women. In a recent study performed in Turkey, the authors found a higher risk of GDM for the patients with blood group AB. **Aim:** This study was done to detect the association of blood group type and the incidence of GDM. **Materials and Methods:** A retrospective study was carried out in 2016 in a group of GDM patients at King Abdulaziz University Hospital (KAUH). Patients were identified using the electronic medical records' system. **Results:** The percentages of patients with GDM for O, A, B, and AB groups were 43.8%, 33.7%, 16.3%, and 6.2%, whereas those of control group (healthy donors) were 38.20%, 33.90%, 24.9%, and 3%, respectively. In both groups, the ratio of the patients with blood group O was the highest, while the ratio of group AB was the lowest. Blood group AB was found to be higher in the patients with GDM compared to the control group. **Conclusion:** Women with AB blood group might have a higher risk of developing GDM. More studies are needed to confirm the finding in this study.

Key words: Gestational diabetes mellitus (GDM); Maternal blood type; Glucose intolerance.

Introduction

Gestational diabetes mellitus or (GDM) is a widely common condition defined as glucose intolerance of relatively different degrees, and it specifically affects pregnant women [1]. It is a significant complication of pregnancy that carries a high risk of comorbidity or mortality to the pregnant woman and her baby. GDM associated with increased incidence of various conditions, such as pre-eclampsia, hypertension, and the chance of developing overt diabetes mellitus (DM) later in life [2].

The pathophysiology of GDM may include insulin resistance or pancreatic β -cell dysfunction, as in late pregnancy, the requirements of insulin increases to meet the high metabolic demands of the mother. In comparison to healthy women, GDM patients show a consistent weak insulin response to nutrients and glucose specifically [3].

Screening of GDM can be done using different methods, includes the 50-gram oral glucose challenge test (OGCT) which is the most used screening method for GDM [4]. Current updated screening method from the International Association of the Diabetes and Pregnancy Study Groups (IADPSG) recommends that the patient should start with fasting glucose test at first prenatal visit, followed by a two-hour 75-gram OGCT at 24 and 28 weeks gestational age when indicated [5]. Moreover, the diagnosis of GDM made when the one or more glucose values fall at or above the specified

thresholds [1]. On the other hand, ABO blood group studies confirm that there are no known diseases that may result from lacking the expression of ABO antigen, but the susceptibility to some diseases are found to be interrelated to patients ABO phenotype. Correlations such as the observation that gastric cancer is more common in group A individuals, whereas duodenal and gastric ulcers occur more commonly among blood group O individuals, remain conflicting [6]. The aim of the present study was to detect the potential relationship between developing GDM and blood group.

Materials and Methods

A retrospective study was performed in a group of pregnant patients with GDM conducted at King Abdulaziz University Hospital (KAUH) from January 2014 until December 2015. Ethical approval was obtained from King Abdulaziz University IRB and the methods were carried out in accordance with the approved guidelines.

By using the electronic medical records' system, patients were identified. Data collection included: personal data, serologically determined blood group and Rh factor, obstetric history (parity), and any known medical illnesses

Fifty-gram OGCT is performed routinely in the present hospital as follows: 50 grams of glucose is dissolved in 200 ml of water and the patient is then asked to drink it in five minutes. After one hour, a blood specimen is obtained and blood sugar levels are tested by glucometer. If the blood sugar is greater than 140 mg, the

Table 1. — Comparison between GDM patients and control group according to blood group.

ABO blood group	Control group, n (%)	Patients with GDM n (%)	p-value
O	89 (38.20%)	78 (43.8%)	0.035
A	79 (33.90%)	60 (33.7%)	
B	58 (24.90%)	29 (16.3%)	
AB	7 (3%)	11 (6.2%)	
Total	233 (100%)	178 (100%)	

Table 2. — Comparison between GDM patients and control group according to blood group and Rh factor.

ABO blood groups with Rh factor	GDM patients	Control group
O Rh+	74 (41.6%)	82 (35%)
O Rh-	4 (2.2%)	7 (3%)
A Rh+	55 (30.9%)	74 (31.6%)
A Rh-	5 (2.8%)	5 (2.1%)
B Rh+	26 (14.6%)	54 (23.1%)
B Rh-	3 (1.7%)	4 (1.7%)
AB Rh+	8 (4.5%)	5 (2.1%)
AB Rh-	3 (1.7%)	2 (0.9%)
Total	178 (100)	233 (100)

screening test is considered positive, and OGCT is used to confirm the diagnosis of GDM.

An initial blood sample was taken after eight to 14 hours of fasting and the patient was asked to drink 100 grams of glucose dissolved in 200–400 ml water within five minutes. Blood samples were taken at one, two, and three hours. The plasma glucose concentration was considered normal if it was below 95 mg/dl (fasting), 180 mg/dl (one hour), 155 mg/dl (two hours), and 140 mg/dl (three hours). A patient was considered to have GDM if two or more values were met or exceeded.

The distribution of blood groups among the patients with GDM were compared to a control group of a total of 233 healthy blood donors who donated blood in Jeddah city (west coast of Saudi Arabia) in the year 2014.

Inclusion criteria: all pregnant women with GDM in King Abdulaziz University hospital in the past two years. Exclusion criteria: all pregnant women with pre-existing DM or uncomplicated pregnancy.

The Statistical Package for the Social Sciences (SPSS version 20) used to analyze data using (chi-square test). The frequency of occurrence of different variables calculated *p* value was less than 0.01.

Results

A total of 178 patients were diagnosed with GDM. The mean age of patients with GDM was 31.1 ± 5.85 years. The percentages of patients with GDM for O, A, B, and AB groups were 43.8%, 33.7%, 16.3%, and 6.2%, whereas those of control group (233 healthy donors) were 38.20%, 33.90%, 24.9%, and 3%, respectively. In both groups, the ratio of the patients with blood group O was the highest, while the ratio of group AB was the lowest (Table 1). There

was a significant difference between the patients with GDM and control group in terms of distribution of ABO blood groups. Blood group AB was found to be higher in the patients with GDM compared to the control group ($p = 0.035$). Also there were no statistical differences in Rh factor distribution among GDM group and control group (Table 2).

Discussion

The pathogenesis of GDM is not yet clear which has led the present authors to think about the hypothesis of association of maternal blood group and the incidence of GDM. Unfortunately there are no sufficient research papers addressing this topic.

The present authors found in this study that patients with blood group AB have the highest risk of developing GDM, which agrees with other studies from Turkey [1], Iran, and India [7], with an increase from 3% in control group to 6.2% in GDM patients. Although this does not agree with a study in Tianjin, China [8] and Thailand [9], as it appears that AB blood group is a protective factor for GDM. Followed by O blood group and A blood group.

The present authors found that blood group B is a protective factor for GDM, as there was a significant decrease from 24.9% in the control group to 16.3% in GDM patients.

Rh factors were not associated with the development of GDM, which also agrees with the study from Turkey [10]. In contrast, another study states that patients with blood group AB have increased risk of DM type 2 [1] therefore we have to be more careful with screening and follow up of GDM and DM type 2 in these patients.

Not only do AB blood group patients have an increased risk of GDM, but they also have a greater risk of increased levels of serum urea and creatinine [7]; hence this suggests abnormal metabolic and endocrine changes in these patients.

More studies are needed to study the association between GDM and blood group because the latter is stable throughout life. Other risk factors should be screened in high-risk blood groups. Genetic studies are needed to clarify the association between blood group and GDM.

Conclusion

In conclusion, the present study found that there is a higher potential susceptibility of patients with AB blood group to develop GDM; hence from this perspective the present authors recommend that individuals with AB blood group should undergo routine OGCT early in gestational age for the early detection of GDM and prevention of unfavorable consequences.

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