

Relationship Between ABO Blood Group and the Incidence of Gestational Diabetes in Pregnant Women in Gorgan, North of Iran

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ABSTRACT

INTRODUCTION: Gestational diabetes mellitus (GDM) is defined as a glucose intolerance that first occurs during pregnancy (1). ABO blood group has an important role in the human body Physiology. Early detection and treatment of GDM reduce its complications (3). So far, the relationship between blood group and GDM disease has been identified. Therefore, the present study was conducted, for determination of the relationship between ABO blood groups with GDM.

METHODS: this cross sectional study conducted between December 2011 and January 2012, and samples were selected from 1262 pregnant women admitted to hospitals and health centers in Gorgan. For all patients, blood group tests and glucose challenge test (GCT) with 50 g glucose was done. And for those participants who have positive GCT, the oral glucose tolerance test (OGTT) were performed. The obtained data by using SPSS software and statistical test chi-square were analyzed at a significant level of $p \leq 0.05$.

RESULTS: In non O blood group, 46 (6%) of participants have GDM while, only 12 (2.8%) of women with O blood group had GDM that was associated with statistically significant difference. Also among non O blood group, AB blood group with 7.4% was associated with the highest risk of GDM. After that, there were ordinarily, blood group B with 6.9%, and blood group A, with 4.7%. that was associated with statistically significant difference.

CONCLUSION: The findings showed that blood group O have preventive effects on the development of GDM and subjects with non O blood group are more likely to suffer from GDM.

Keywords: ABO blood group, gestational diabetes, incidence

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INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as a glucose intolerance that first occurs during pregnancy (1). Its prevalence varies from 1-14% during pregnancy. Which depends on the area, population, data collection methods and Non-random selection of mothers (2).

GDM can lead to increased morbidity, mortality, and complications in pregnancy. Including IUFD, macrosomia, birth trauma, metabolic disorders such as: hypoglycemia, hyperbilirubinemia and Polycythemia. Early detection and treatment of GDM improves and reduce complications for mothers and the fetus (3).

ABO blood group has an important role in the human body Physiology. A and B antigens there are on the surface of red blood cells and other tissues including vascular endothelium, epidermis, Glandular and internal visceral epithelium. Its mechanism of action is through the impact of genetic variants in the ABO locus on the performance of some biological materials such as proinflammatory cytokines, binding Molecules and thrombogenic factors (4).

So far, the relationship between blood group and 70 disease has been identified: including gastric ulcer, Duodenal ulcers, heart attack, atherosclerosis, gastric cancer, bladder cancer, and Etc (5, 6, 7). This is while there has not been found any Communication between Other blood groups, MN, Kell, Duffy or Kidd and other types of diseases (8).

Blood group distribution pattern varies depending on the race of people and geographical areas around the world (4). All previous studies in the West were with a different distribution pattern of ABO phenotypes in pregnant women therefore in this study we investigate the relationship between ABO blood groups and GDM in north of Iran.

METHODS AND MATERIALS

A cross-sectional study carried out in a teaching hospital and primary health and treatment centers in Gorgan city (Golestan state in east of Caspian sea Iran).

In this study we used 50 gr glucose challenge test (GCT) as a universal screening for GDM. GCT was performed for all pregnant women who attended the antenatal service at Dezyani hospital and primary health and treatment centers in Gorgan between December 2011 and January 2012.

The screening and diagnosis of GDM have remained controversial. Since 2011 the ADA recommended single 75 gr oral glucose tolerance test (OGTT) at 24 – 28 weeks of pregnancy as screening and diagnostic test for GDM (14). In time of study, in Iran, except some of research centers, we used Glucose Challenge Test (GCT) test for universal screening. In this study we used this method

A total of 1276 pregnant women were randomly recruited in to the study.

Pregnant women with pregestational diabetes mellitus, twin pregnancies or terminations before 24 weeks of gestational age and those on steroids were excluded. At the first antenatal visit, a structured questionnaire was administered to obtain baseline sociodemographics and relevant obstetric data such as age, parity, gestational age, education and occupation. Participant's weight (before 12 wks), height and blood pressure were measured, body mass index (BMI) was calculated and documented.

If the pregnant woman had at least one of the risk factors of GDM, early screening was performed with 50 g oral glucose challenge test (GCT). Risk factors for GDM which we used as a guide for early screening were: age >25 years, obesity (BMI >30 K/M²), familial history of diabetes, previous macrosomia (birth weight >4000g), congenital malformations, stillbirth or

unexplained abortion .history of previous impaired fasting glucose,GDM,gestational hypertension or preeclampsia in previous pregnancy.

For other pregnant women ,the screening test was,done at 24-28weeks of pregnancy.a 1h serum glucose value $>130\text{mg/dl}$ on the glucose challenge test(gct),was considered as a positive screen,women with a positive screen underwent a 100g 3h OGTT after an overnight 8h fasting .

Glucose load was dissolved in 250 ml of water and each subject was instructed to ingest it over 5min.the diagnosis of GDM was base on the criteria of carpenter and coustan ,when at least two of four oral GCT values were raised:fasting $>95\text{mg/dl}$,1h $>180\text{mg/dl}$ 2h $>155\text{ mg/dl}$ and 3h $>140\text{ mg/dl}$.if only one of four samples was impaired ,a100g the 3h oral GTTwas repeated at 4 weeks later.

Statistical analysis :the data were analyzed using soft ware spss version 16.descriptive statistics was done and shown as mean+_sd,student t test was used to comare means of continuous variables.odds ratio(ors)with a95% confidence interval (ci) were calculated.All p values were,with the level of signficance set at 0.05.

RESULT

A total of 1262 pregnant women participated in the study 1192 subjects were completed the study procedures. 200 (16.77%) women had positive GCT test and After performing OGTT test was determined that 58(4.9%) cases, had GDM, based on the criteria carpenter and coustans.

The blood group distribution in our study is similar to the general iranian population⁶ that is presented in table (I). The order of ABO boold group percentage in present study were as follow:

O blood group 422(35.4%) , A blood group 359(30.1%) , B blood group 317(26.5%) and AB blood group 94(7.8%).

Distribution of GDM according to non O and O blood group is shown in Table number (II). Out of 770 pregnant women with non o blood group 46 (6%) participants had GDM and only 12 (2.8%) of 422 cases with O blood group, had GDM, and that was associated with statistically significant difference.

Distribution of GDM in non o blood group is presented in Table (III). percentage of Gestational diabetes in non o blood group,were as follow:

7(7.4%) of 94 cases with AB blood group had GDM , 22(6.9%) of 317 participants in B blood group and 17(4.7%)of subjects of 359 A blood group, had GDM .

so Respectively , AB, B, and A blood group had the most association with GDM (P value <0.05), that was associated with statistically significant difference.

DISCUSSION

Abo blood groups are described as carbohydrate fragments that bind to a protein called H and its presented on the surface of red blood cells.In addition to these cells, the antigens are also presented on the surface of epithelial cells of Gastrointerstitiall and bronchopulmonary system, sensory neurons,platelets, and the vascular endothelium (9,10).

In addition to its role in immunohaematology, there is Numerous study that show the ABO blood group also have asignificant role in different human diseases such as cardiovascular, infectious and neoplastic disorders(10).

in Zhang et al Systematic Review and Meta-analysis study have found that A blood group have associated with increased risk of cancer while O blood group have associated with decreased risk of it (11).

Pelzer U et al study in germany have shown that A blood group is more frequent in pancreatic cancer while less patients with O blood group suffer from pancreatic cancer (12).

Also, In wolpin study, have mentioned that O blood type versus non o blood group, were associated with a greater incidence of pancreatic cancer (13). Furthermore, the association of diabetes mellitus with gastric and esophageal cancer have been identified (14,15).

The data on association between the ABO blood types and diabetes is conflicting, some studies reporting no association and others showed positive association (16,17,18).

in a study from Bangladesh indicated that there was no association between ABO blood groups and DM while Muhammad Kamil study, showing there was a negative association between A and O blood groups and DM type 2 (19). The similar results have also found in another study that A and B Blood groups are less common whereas blood group AB is more common in diabetes. (20)

In another study a higher association of B blood group and lower association of O blood group with type 2 diabetes have been identified (16). In Contrast to various studies about the association of diabetes with blood group, few studies have existed about the association of gestational diabetes with ABO blood. In present study, non O blood group in comparable to o blood group had higher incidence of GDM, And between non o blood group, GDM was more frequent in AB blood group.

The results of our study is similar to the studies about the association between ABO blood group and incidence of type 2 diabetes.

In addition ,Seyfizadeh and his colleague study conducted in Iran have demonstrated that FBS levels in pregnant women with AB blood group was higher than A blood group .Also, creatinin and urea levels were higher in AB blood group, In the other words, ABO blood group, may be a risk factor and had a predictive value for adverse pregnancy-outcomes (21)

It is interesting to note that Our findings are similar to Seyfizadeh et al study and shown that GDM was more frequent(common) in non O blood group particularly AB .

On the other hand, Phaloprakarn et al study in 2013 about Maternal ABO blood group and adverse pregnancy outcomes, showed that incidence of preeclampsia in AB and A blood group was significantly higher than O blood group , and no relationship was found between ABO blood group and GDM, preterm labor , low birth weight or SGA .(4)

Moreover Lee and his colleague study in 2013 demonstrated that NON O blood group in comparable to, o blood group was more commonly seen in hypertensive disorders in pregnancy particularly eclampsia and between NON O, blood group, AB had the highest risk of hypertension in pregnancy and o blood group had the lowest risk.(22)

As obvious from the above discussion, it looks, as a lot of other illnesses, gestational diabetes have positive association with ABO blood group. AB blood group have the highest risk of gestational diabetes and O blood group is a protective factor for this disease.In our country with the average prevalence of gestational diabetes, we can use maternal ABO blood group as a risk factor for making decision for screening ,that is an available and affordable test and also in all pregnant women routinely be checked

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Table 1: Distribution of ABO blood group general Iranian population (6).

Blood group	O	A	AB	B
Prevalence	%36.35	%32.14	%7.79	%23.72
In Iran				

Table 2: Distribution of GDM according to non O and O blood group

Blood group	GDM positive%(n)	GDM negative%(n)	total
Non O blood group	6.0%(46)	94.0%(724)	770
O blood group	2.8%(12)	97.2(410)	442

Table 3: Distribution of GDM according to non O blood group

Blood group	GDM positive%(n)	GDM negative%(n)	total
A	4.7%(17)	95.3%(342)	359
B	6.9%(22)	93.1%(295)	317
AB	7.4%(7)	92.6(87)	94