Comparing Parity, Socio-demographic and Serum Vitamin D among Pregnant Women with and Without GDM

Bushra Jabbar Hamarashid[1], Atiya Kareem Mohammed[2]

[1]Ph.D. Student, Diabetes and Endocrine Center, General Teaching Hospital,
[2]Assistant. Prof. Dr. Maternal Neonatr Nursing, College of Nursing, University of Sulaimani

Abstract

Background: Gestational diabetes mellitus can affect pregnancy in short and long term, for both mother and her offspring. Nearly 1% to 28% of all pregnancies are complicated by GDM. Knowing the risk factors can prevent the onset of GDM and early detection of GDM, which is important to prevent or minimize the GDM consequences and optimum treatment.

Objective: To compare the parity, socio-demographic and serum vitamin D state of pregnant women with and without gestational diabetes mellitus.

Method: This is a descriptive analytic study conducted in the Maternity Teaching Hospital in Sulaimani city from December 2018 to January 2019 among 100 pregnant women with GDM and 162 healthy pregnant women. The face-to-face interview was used to collect the information regarding socio-demographic and obstetric history through a specific written questionnaire. At the same time serum vitamin D state was examined using the Roche Elecsys vitamin D_3 assay.

Result: The study found that body mass index, educational state, age at marriage, parity and gravidity significantly higher in the GDM group compare to the non-GDM group. Socioeconomic state does not differ significantly in both group p=0.069.

Keywords: *Serum, vitamin D, pregnant, GDM.*

Introduction

Gestational diabetes mellitus (GDM) remarkably elevates the risk of later life type two diabetes mellitus[1]. GDM is defined as carbohydrate intolerance of varying severity that start or diagnosed during pregnancy. The definition is applicable regardless of whether insulin is used for treatment or the condition persists after pregnancy. GDM is adversely affect the pregnancy outcome not only for the mother, but also it affect fetus, neonate, child adult offspring of diabetic mother[2]. The most frequent complications of pregnancy with diabetes are hyperglycaemia, which increases the risk of pre-eclampsia, premature delivery, and caesarean section. GDM also increases the risk of type two diabetes mellitus in the few years after pregnancy. Women with GDM at higher risk of some chronic diseases such as metabolic syndrome, obesity, cardiovascular morbidities and recurrent GDM in following pregnancy. Also, there are maternal implications secondary to a delivery of a macrosomic or large for gestational age (LGA) fetus, such as an increased rate of cesarean delivery, postpartum hemorrhage (PPH), birth trauma and shoulder dystocia[3]. The worldwide prevalence of GDM cannot be estimated exactly because of the differences in the diagnostic criteria, race/ethnicity and socio-economic statues of individuals[4]. So, the results of the studies concerning prevalence of the GDM highly variable among countries which ranging from 0.6 to 15%[5].

The incidence is estimated at 7% worldwide, although the incidence of GDM has increased in the last decades and predicted to increase in future because of the increase in the associated risk factors[6]. The well known risk factors of GDM includes pre-pregnancy body mass index (BMI)^3 30 kg/m^2, obesity, 35 years and

older at delivery, metabolic syndrome, hypertension, family history of diabetes mellitus or history of GDM, history of unexplained still birth, history of having infant with congenital anomaly, history of macrosomic infant, long term use of steroids, glycosuria, impaired glucose metabolism[7]. A number of the studies found the association between vitamin D deficiency and risk of gestational diabetes mellitus[4,7-8] However, in one large prospective study no association found between vitamin D level and GDM[10]. The huge number of epidemiological studies supports the direct association between serum vitamin D level and insulin responsiveness. Vitamin D deficiency in pregnant women increases risk of gestational diabetes mellitus and pre-eclampsia for mother and increases chance of being small for gestational age for offspring[11]. The current study tried to compare gravida, para, socio-demographic and serum vitamin D levels of the pregnant women with gestational diabetes mellitus and without gestational diabetes mellitus in Sulaimani City.

Method

Study design and population: This is a descriptive analytic study involving 262 pregnant women, 100 pregnant women with GDM and 162 pregnant women without GDM.

This study was conducted at Gestational Diabetes Center, Maternity Teaching Hospital in Sulaimani city, between December 2018 to January 2019. A non-probability purposive sample was used for selecting study population depending on the inclusion criteria. The inclusion criteria were pregnant women with gestational age more than 24 weeks. The study excludes pregnant women with pre-pregnancy BMI more than 35 and pregnant age more than 40 years old. In the group of GDM, 100 g oral glucose tolerance test (OGTT) was performed to confirm gestational diabetes. Finally, the total of 262 pregnant women recruited in the study. The Ethical Committee of the university of Sulaimani approved this study.

Data Collection: The data collected using questionnaires, by a trained researcher using face-to-face interview. The questions categorized in two parts of socio-demographic history, such as age, blood group, occupation and obstetric history, such as age at marriage, para and gravida. The blood sample was drowned from the participants on the day of the interview and centrifuged at 5000 r/m for 5 minutes, followed by separation of the serum that stored at -80°C in freeze until they defrosted for measurement of serum 25 dehydroxyvitamin D. In this study vitamin D level categorized into three groups of sufficiency (more than 30ng/mL), insufficiency (between 20ng/mL and 30 ng/mL) and deficiency (less than 20ng/mL).

The validity ascertained through a pane; group of 12 experts and reliability calculated by using the correlation coefficient that was 1=0.884 (statistically adequate). A pilot study applies to groups of 20 pregnant women visiting maternity teaching hospital.

Statistical analysis: the data were analyzed using SPSS version 23.0 software program.

Results

A total of 262 pregnant women recruited in the study. The table 1 shows the demographic characteristics of the pregnant women with and without GDM. In the GDM group majority of samples were at the age between 30 to 39 years old which were 54.0% of the total participants, 41.0% of them were at the age between 20 to 29 years old and the minority of the samples were at the age of 40 and more years which were merely 2.0%. Moreover, the mean and standard deviation of age distribution were 30.10, 4.95 respectively. In non-GDM group majority of samples were in age between 20 to 29 years old which were 54.3% of the total participation; 44.9% of them were aged between 30 to 39 years old and the minority of the total sample was at age of 40 years old and more which were merely 0.61%. Moreover, the mean and standard deviation of age distribution were (28.33, 5.03) respectively.

The table, one shows the obstetric history of the participants with and without GDM. It can be seen in the table that in the GDM group the majority of participants had aged at marriage between 20 to 29 years, which were 65.0% of the total samples. Those who aged at marriage 30 years and over were merely 10.0% of the total samples. However, in non-GDM group majority of participations were getting married between 20 to 29 years, which were 74.7% of the total samples, the minorities of the participatnts (2.5%) were getting married for 30 years and over.

It is indicated that in GDM group, the majority of the samples (54.0%) of the total participants were in 20 to 29 weeks of gestational age. Moreover, the mean and standard deviation of gestational age equals (29.47, 4.70) respectively. It is indicated in the table that in non-

GDM, 56.2% of the total participation were in 20 to 29 weeks of gestational age and 43.8% of them were in 30 to 39 weeks of gestational age. Moreover, the mean and standard deviation of gestational age equals (29.89, 4.18) respectively.

In the GDM group, 23.0% of the total participations had gravid number one or less and 77.0% of them more than one. Also in non-GDM group, 37.7% of the total participations had gravid number equal to one and 62.3% of them more than one of gravida. The mean and standard deviation were (1.96, 1.06) respectively.

Regarding the number of delivered babied in GDM group, 68.0% of the total participations had a Para one or less and 32.0% of them more than one. In non-GDM group, 85.2% had para number equal to one or less and 14.8% of them had para number more than one.

Table (1): Obstetric history of pregnant women with and without GDM.

Variables	Items	GDM (n=100) Percent	Non-GDM (n=162) Percent	Total	P value
Age at marriage	Less than 20 years	25 (25%)	37(22.8%)	62	0.023
	20- 29 years	65 (65%)	121(74.7%)	186	
	30 years and over	10 (10%)	4(2.5%)	14	
Gestational age	Less than 20 Weeks	3 (3%)	0(0%)	3	0.085
	20- 29 Week	54 (54%)	91(56.2%)	145	
	30- 39 Week	43 (43%)	71(43.8%)	114	
Gravida	Equal to one	23 (23%)	61(37.7%)	84	0.014
	More than one	77 (77%)	101(62.3%)	178	
Para	One and less	68 (68%)	138(85.2%)	206	0.001
	More than one	32 (32%)	24(14.8%)	56	

Table one compare the association between obstetric characteristics of the both group and significance of the association. The p value was significant at p vale less than 0.05.

Table (2): Vitamin D status among the study sample

Vitamin D Status	GDM (n=100) Percent	Non-GDM (n=162) Percent	P-value
Deficiency	77.0	68.5	0.463
Insufficiency	13.0	20.4	
Sufficiency	10.0	11.1	

Table two shows the vitamin state of both groups in percent. The p value less than 0.05 were significant.

Discussion

In a study of the association between blood group and disorders it should be taken to account that the distribution of ABO phenotypes varies across the globe and it depends on racial/ethnic origins and geographical regions. In the current study no association found between blood group and risk of GDM. However, association between maternal blood group and risk of GDM reported by several studies. Blood group AB was found to be significantly (p=0.029) higher in GDM women compared to non-GDM women[14]. This finding in contrast with a recent study from the People's Republic of China, which was a prospective cohort study Chinese women and demonstrated that women with blood group AB were less likely to have a GDM[15]. Relationship between maternal ABO blood group and risk of pregnancy outcome studied among 55320 singleton pregnant women (16). The study demonstrated that there is no any significant association between ABO blood group and GDM. The results of the studies are

not consensus. Different results regarding the magnitude of associations among these studies might lie on various sample sizes, racial/ethnic origins studied, and population characteristics.

The risk of T2DM and low social economic state has been established in previous studies[17]. The definition of socioeconomic state varies in different regional and countries; however, most of the studies agreed that low socioeconomic state increase the risk of GDM development. The current study found no significant differences between Socio-economic state of GDM and non GDM group. In the study that carried out in china to demonstrate association between lifestyle factor and risk of GDM development, significant association found between income and risk of GDM. They found that women with lower income at higher risk of GDM compare to high income women[18]. A large population based study from Australia reported that low socioeconomic state inversely associated with the risk of GDM[19] and no association found in the study which carried out by Janghorbani *et al*. The finding of another study indicated that higher household income was associated with lower risk of GDM[20].

Obesity that defined as BMI more than 29 kg/m^2, remains an important and increasing risk factor for GDM. Additionally, this relationship appears to vary by race and ethnicity. The risk of GDM between obese Latina and Asian women is twofold higher than African-American and Caucasian women. The current study found significant differences between BMI of women with GDM and without GDM. The large retrospective cohort study that include 24,325 pregnant women, examined the association between BMI and risk of GDM between different ethnicity and race. The study found higher prevalence of the GDM among groups with high BMIs[21]. A prospective cohort study looked at the effect of maternal BMI on GDM and risk of adverse pregnancy outcome. They reported increased prevalence of GDM with increasing BMI[22].

The previous studies suggest that the educational level of the mother does not affect the risk of gestational diabetes directly, however, it is more likely to act through more proximal risk factors, so it is called mediators. Several factors considered to be potential mediators in the pathway between maternal education and GDM, for instance. Substance use during pregnancy, such as: alcohol consumption and smoking, nutritional information, stress and pre-pregnancy BMI. The large strong population-based prospective study which carried out among large group of pregnant women from beginning of the study revealed that low educational level is associated with a three times higher risk of developing GDM compared with a high educational level[23]. Significant differences found between the educational state of the pregnant women with GDM and without GDM. In an observational register-based cohort study, the risk factors of GDM studied among 7750 women from the city of Vantaa. The result of the study showed that primiparous women who aged more than 35 years had significantly higher risk of GDM. There were no any significant differences found between vitamin D statuses of the both groups. In both groups of GDM and non- GDM almost 70 percent of the cases had serum vitamin D levels less than 20ng/mL. in the numbers of studies it has been proposed that vitamin D deficiency can trigger the onset of diabetes during pregnancy and several mechanisms defined. The studies showed that active form of vitamin D (1,255 $(OH)_2$D) play a role in stimulation of insulin production and enhance sensitivity to insulin, thus vitamin D deficiency may involved in the development of GDM (25). The two cross-sectional studies showed that serum level of the vitamin D level is lower in GDM women compare to non-GDM women[14,8].

Conclusion

Body mass index, education, residency, age at marriage, parity and Gravidity are the factors that affect the development of GDM. Socio-economic state has not been associated with risk of GDM.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Diabetes and Endocrine Center and all experiments were carried out in accordance with approved guidelines.

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