Original Article

Feto-Maternal Complications in Diabetes

Feto-Maternal Complications in Gestational Diabetes and in Pre-Existing Diabetes Mellitus

Asifa Alia, Riaz Ahmad and Maria Husain

ABSTRACT

Objective: Study aimed to compare the feto-maternal outcomes in pregnancy with gestational diabetes to pregnant women with preexisting diabetes.

Study Design: Descriptive observational clinical study

Place and Duration of Study: This study was conducted at the Doctors Trust Teaching Hospital affiliated with Rai Medical college Sargodha for one year from January 2019 to January 2020.

Materials and Methods: A population of pregnant women (n= 240) with singleton pregnancies were enrolled and divided into two groups based on pre-existing (group A, n=120) and gestational (group B, n=120) diabetes diagnosed by 2-hr-75g-OGTT. Descriptive analysis of categorical data was presented as frequencies and percentages. Pearson chi square test of independence was applied for qualitative variables. Statistically, p-value <0.05 was considered significant.

Results: The most recurrent maternal complication was vaginal candidiasis (46.67% & 43.3%) as seen in both groups A and B respectively. In the groups, 30 % of the pre-gestational diabetic mothers suffered from preterm labor in comparison to the 23.3% of gestational diabetic mothers. Equal incidence of urinary tract infection (23.3%) and pregnancy induced hypertension (30%), polyhydromnias (16.6%), preterm rupture of membranes (10%), and intra uterine growth retardation (6.67%) were observed in both groups. Though gestational diabetic mothers developed 13.3% and 6.67% hypertension and postpartum hemorrhage respectively as compared to the pre gestational mothers in which only hypertension was observed (13.3%). Fetal complications in "group A" included NICU admission, low birth weight, still births, shoulder dystocia and congenital anomalies whereas group B neonates had higher frequency of macrosomia, and hypoglycemia.

Conclusion: Both GDM and preexisting diabetes have adverse feto-maternal outcomes; however some complications are seen more in pre-gestational as compared to gestational diabetes.

Key Words: Diabetes Mellitus, Gestational Diabetes, Feto-maternal Outcomes

Citation of article: Alia A, Ahmad R, Husain M, Chaudry B. Feto-Maternal Complications in Gestational Diabetes and in Pre-Existing Diabetes Mellitus. Med Forum 2020;31(4):45-49.

INTRODUCTION

It is estimated that more than 360 million people will have diabetes by the year 2030 and women of childbearing age are at increased risk of developing diabetes during pregnancy. The increased prevalence is attributed to the sedentary life style, urbanization and obesity[1,2]. Pregnancy affects both the maternal and fetal metabolism and even in non-diabetic women exerts a diabetogenic effect.

Department of Obs and Gynea, Rai Medical College, Sargodha-Islamabad Road, Sargodha.

Correspondence: Prof.Dr.Riaz Ahmad.Professor of Gynae Rai Medical College Sargodha, 55 Tulip Extension Bahria Town, Lahore.
Contact No: 03004389976, 03454414440
Email: riazmughal111@outlook.com

Received: February, 2020
Accepted: February, 2020
Printed: April, 2020

The overall prevalence of gestational diabetes mellitus is increasing worldwide, with an overall score of 2.8% to 5% globally and is estimated to rise by the year 2030[3]. Incidence of gestational diabetes in Pakistan is about 8%[4], Pre-existing diabetes in women can lead to infertility, and during pregnancy it predisposes the fetus to many developmental alterations, and diabetes related complications to the mother[5] Normal pregnancy leads to insulin resistance and pancreatic β-cells reserve is stressed aiming to maintain glycemic level within normal ranges. If this reserve fails to maintain glycemic control then the result is development of gestational diabetes[6].

A higher risk of obstetrical complications including miscarriage, pre-eclampsia and preterm labor is observed in women[7]. Fetal exposure to maternal diabetes is associated with birth defects, congenital malformations, macrosomia, birth injury, perinatal mortality and postnatal adaptation problems such as hypoglycemia. On the other hand children exposed in utero to maternal diabetes are at higher risk of obesity and diabetes suggesting the effect not exclusively

genetic[8]. Despite major advances in clinical management, a higher incidence of malformations and perinatal morbidity is observed. Therefore this study aimed to compare the feto-maternal outcomes in pregnancy with gestational diabetes to those pregnant women with preexisting diabetes in Pakistani population.

MATERIALS AND METHODS

An observational study recruiting a total of two hundred and forty singleton pregnant females was conducted during a period of 1year. Females with pre pregnancy diabetes or diagnosed as having diabetes before the 24th week of gestation were classified as pre-diabetics (Group A; n=120); whereas a 2 hour-75gm oral glucose tolerance test was administered at 28th week of gestation for screening and recruiting females with gestational diabetes. . The pregnant females were classified as GDM if any of the following plasma glucose value was exceeded; Fasting: ≥92 mg/dL (5.1 mmol/L), 2 h: ≥153 mg/dL (8.5 mmol/L)[9]. These females were recruited as GDM (Group B; n=120). Females with impaired glucose tolerance, normal glucose tolerance, hypertension, thyroid disorders, and twin pregnancies or with any other life threatening complications for both mother and fetus were excluded from this study.

The maternal outcomes noted were vaginal candidiasis, urinary tract infection (UTI), preterm labor, polyhydromnios, preterm rupture of membranes (PROM) hypertension, intra uterine growth retardation (IUGR) and pregnancy induced hypertension (PIH). The fetal complications observed were weight over 4 kg or below 2.5 kg, hypoglycemia, shoulder dystocia, congenital abnormalities, still birth and neonatal intensive care unit (NICU) admission.

A statistical analysis of data was performed using SPSS (version 16; SPSS Inc., Chicago, IL, USA). Descriptive analysis of categorical data was presented in terms of frequencies and percentages. Pearson chi square test of independence was applied for qualitative variables. In all statistical analysis only p-value <0.05 was to be considered significant.

RESULTS

.The detailed results are shown in tables 1 to 4. Briefly, mean age of preexisting DM group was 32.80 ± 5.49 while mean age of GDM was 28.70 ± 3.92. GDM was commonly seen in young women (p=0.002) with multiple pregnancies, while pre gestational DM was associated with a higher rate of caesarian section, and increased maternal mortality [Table 1]. The most frequent maternal complication observed in both groups was vaginal candidiasis (46.67% & 43.3%), while the frequency of preterm labor was more prominent in the pre-gestational diabetic group (30%) as compared to the gestational diabetic mothers (23.3%). Equal incidence of urinary tract infection and pregnancy induced hypertension (23.3% & 30%); polyhydromnias (16.6%), preterm rupture of membranes (10%), and intra uterine growth retardation (6.67%) were observed in both groups. [Table 2] Gestational diabetic mothers had a higher predisposition to develop hypertension and postpartum hemorrhage (13.3% and 6.67% respectively) as compared to the pre gestational mothers. Fetal born to mothers with preexisting diabetes had more NICU admission, low birth weight, still births, shoulder dystocia and congenital anomalies whereas neonates of gestational diabetic mothers had higher frequency of macrosomia, and hypoglycemia. [Table 3]. Most females with pre-existing diabetes and GDM were managed by insulin (85% and 65%) respectively, while few were put on dietary restrictions (15% and 35%) respectively. (Table4).

Table No.1: Age Distribution, Gravidity and Mode of Delivery: A Comparison in Pre-Gestational DM & GDM

GROUP – A (Pre Gestational DM) (n=120)		GROUP – B (GDM) (n=120)
Age (in years)	Number(Percentage)	Number (Percentage)
21 – 30	48(40)	87(73)
31 – 40	72(60)	33(27)
> 40	00(00)	00 (00)
Gravidity		
Primi-gravida	16(13.33)	36(30)
2-4	72(60)	72(60)
>4	33(27.5)	12(10)
Mode of delivery		
SVD	48(40)	76(63.33)
LSCS	72(60)	44(36.67)

Table No.2. Common Maternal Complications: A Comparison in Pre-Gestational DM & GDM

Complications	GROUP –A (Pre gestational DM) (n=120)	GROUP – B (GDM) (n=120)	
	No. of patients(Percentage)	No. of patients (Percentage)	p-value
Vaginal Candidiasis	56(46.67)	52(43.33)	0.795
UTI	28(23.33)	36(30)	0.559
PIH	28(23.33)	36(30)	0.559
Preterm Labor	36(30)	28(23.33)	0.623
Poly-hydromnias	20(16.67)	20(16.67)	1.000
PROM	12(10)	20(10)	1.000
PPH	00(00)	08(6.67)	-
IUGR	08(6.67)	08(6.67)	1.000
Hypertension	04(3.33)	16(13.33)	0.161

Table No.3. Common Fetal Complications: A Comparison in Pre-Gestational DM & GDM

Complications	GROUP –A (Pre gestational DM) (n=120)	GROUP – B (GDM) (n=120)	
	No. of patients(Percentage)	No. of patients(Percentage)	P-Value
Weight > 4kg	20(16.67)	24(20)	0.644
NICU admission	64(53.33)	28(23.33)	0.824
Hypoglycemia	12(10)	24(20)	0.375
Weight <2.5kg	08(6.67)	04(3.33)	0.554
Shoulder dystocia	08(6.67)	04(3.33)	0.225
Congenital abnormalities	16(13.33)	04(3.33)	0.375
Stillbirth	04(3.33)	16(13.33)	0.375

Table No.4. Treatment options: A Comparison in Pre-Gestational DM & GDM

Complications	GROUP –A (Pre gestational DM) (n=120)	GROUP – B (GDM) (n=120)	
	No. of patients (Percentage)	No. of patients(Percentage)	P-Value
Diet	18 (15)	42 (35.5)	0.04
Insulin	102 (85)	78 (65)	0.03

DISCUSSION

Diabetes is the most common disorder complicating 3-5% of all pregnancies; our results are consistent with the previous studies. Iincidence in young primi gravida was found to be <1%[10]. Another study by Akhter et al.[11] showed an overall 3.3% prevalence of GDM among Pakistani women. It is plausible by these reports that multiple pregnancies predispose to hyperglycemic states and lead to the development of GDM. However, risk of hypertension and preeclampsia has been proven to increase with increasing age and BMI, independently of maternal glycemia. Contrary to our results no differences were observed in terms of frequency of complications in patients with and without gestational diabetes by Bodmer-Roy. Perhaps this was due to the difference in population, and screening criteria. (Table 1)

Moreover among the study groups, the rate of preterm delivery was higher in pre-existing diabetic mothers which is consistent with the results of previous studies[12], especially relating with Indian women where the frequency of preterm deliveries reported was about 8.2%[13].

The finding of this study indicated that 20% of neonates born to GDM pregnant females were large sized (macrosomia) and suffered from post-delivery hypoglycemia (Table 3). These findings are in accordance with the studies done by Wahabi and group[14] where almost 11% of the new born delivered to the diabetic mothers was macrosomic. Poorly controlled maternal diabetes has undesirable influences on fetal weight and growth, which results in macrosomia and intrauterine growth restriction[15]. This effect may be due to high availability of insulin, amino-acids, and glucose and lipid levels in the blood. All these factors play a role in organogenesis[16]. Other factors also influences fetal macrosomia including maternal age over 30 years, prolonged pregnancy, multiparity and maternal obesity[17]. Overall 60% patients were delivered by caesarean section. Similar results were also observed in a study conducted by Reem Zeki et.al which showed total cesarean section rate of 53.6% for women with pre gestational diabetes and 36.8% for women with gestational diabetes[18]. One of the likely explanations of this is history of previous cesarean section in multigravidas. Another likely explanation for this finding is macrosomia which in turn is associated with significant maternal and

perinatal complications including increased rate of C/S, birth asphyxia and perinatal mortality[19]. The perinatal mortality was high in established diabetics as compared to GDM, in our study population.[20] Similar outcomes were observed by other investigators[20,21,22]. The fetal complications including shoulder dystocia, small for gestational age, congenital malformations and NICU admissions were higher in diabetic group when compared with GDM group in our study. These findings are in line with the studies done by Vangen et al[23], who observed increased risks for low birth weight, macrosomia, preterm birth, preeclampsia, and cesarean sections in women with predominantly type 2 diabetes.

When the overall outcomes where compared to different study populations (like Caucasians, Moroccan, African American, Hispanic, and Indian) we found somewhat similar results with exception of preterm labor, polyhydromnia, pregnancy induced hypertension, macrosomia, shoulder dystocia and still births being more common in our study population[24]. The importance of these findings is that it investigated a key public health problem and that it gives preliminary indicators about the impact on pregnancy outcome in the Pakistani population. Such information is imperative for practice and research considering the paucity of data and health care for managing the complications related to diabetic pregnancy in our population. Very few patients in our under resourced country get pre pregnancy care. It should however be emphasized that pre pregnancy care markers, especially HbA1c prior to discontinuation of contraception is associated with lower rates of adverse pregnancy outcome[25]. Diabetic pregnancy is an important cause of perinatal morbidity and mortality, as more than half of perinatal deaths worldwide are contributed by South East Asia.

CONCLUSION

This study concluded that both gestational and pre-diabetes have adverse feto-maternal outcome. But there are no significant differences or increased association between the two groups. However some complications such as LSCS, NICU admission, shoulder dystocia, congenital malformation are slightly more but statistically non-significantly associated with pre-gestational DM.

Author's Contribution:

Concept & Design of Study:	Asifa Alia
Drafting:	Riaz Ahmad
Data Analysis:	Maria Husain
Revisiting Critically:	Asifa Alia, Riaz Ahmad
Final Approval of version:	Asifa Alia

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care 2004; 27: 1047–1053.
2. Cowie CC, Rust KF, Byrd-Holt DD, Eberhardt MS, Flegal KM, Engelgau MM, et al. Prevalence of diabetes and impaired fasting glucose in adults in the U.S. population: National Health and Nutrition Examination Survey 1999–2002. Diabetes Care 2006;29:1263–1268.
3. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res Clin Pract 2010; 87(1): 4-14.
4. Iqbal R, Rafique G, Badruddin S, Qureshi R, Cue R, Gray-Donald K. Increased body fat percentage and physical inactivity are independent predictors of gestational diabetes mellitus in South Asian women. Eur J Clin Nutr 2007; 61: 736-42
5. Narayan KM, Boyle JP, Thompson TJ, Sorensen SW, Williamson DF. Lifetime risk for diabetes mellitus in the United States. JAMA 2003;290: 1884–1890.
6. Jovanovic L, Pettitt DJ. Gestational diabetes mellitus. JAMA 2001;286:2516–2518.
7. .Bodmer-Roy S, Morin L, Cousineau J, Rey E. Pregnancy Outcomes in Women with and Without Gestational Diabetes Mellitus According to the International Association of the Diabetes and Pregnancy Study Groups Criteria. Obstet Gynecol 2012;120:746–52.
8. Dabelea D, Hanson RL, Lindsay RS, Pettitt DJ, Imperatore G, Gabir MM, et al. Intrauterine exposure to diabetes conveys risks for type 2 diabetes and obesity: a study of discordant sibships. Diabetes 2000; 49: 2208–2211.
9. Panel IC. International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy. Diabetes Care 2010;33: 676-682.
10. Jawa A, Raza F, Qamar K, Jawad A, Akram J. Gestational diabetes mellitus is rare in primigravida Pakistani women. Indian J Endocrinol Metab 2011; 15(3): 191–193.
11. Ahkter J, Qureshi R, Rahim F, Moosvi S, Rehman A, Jabbar A, et al. Diabetes in pregnancy in Pakistani women: Prevalence and complications in an indigenous south Asian community. Diabet Med 1996; 13:189–91.
12. Syngelaki A, Bredaki FE, Vaikousi E, Maiz N, Nicolaides KH. Body mass index at 11–13 weeks' gestation and pregnancy complications. Fetal Diagn Ther 2011; 30: 250–65.
13. Shefali AK, Kavitha M, Deepa R, Mohan V. Pregnancy outcomes in pregestational and gestational diabetic women in comparison to non-

diabetic women--A prospective study in Asian Indian mothers (CURES-35). J Assoc Physicians Ind 2006; 54:613-8.
14. Wahabi HA, Esmaeil SA, Fayed A, Al-Shaikh G, Alzeidan RA. Pre-existing diabetes mellitus and adverse pregnancy outcomes. BMC Research Notes 2012, 5: 496
15. Rackham O, Paize F, Weindling AM. Cause of death in infants of women with pregestational diabetes mellitus and the relationship with glycemic control. Postgrad Med 2009, 121: 26–32.
16. Carpenter MW, Canick JA, Hogan JW, Shellum C, Somers M, Star JA. Amniotic fluid insulin at 14-20 weeks' gestation: association with later maternal glucose intolerance and birth macrosomia. Diabetes Care 2001; 24: 1259-63.
17. El FC, Mourali M, Ouerdiane N, Oueslati S, Hadj HA, Chaabene M, et al. Maternal and fetal outcomes of large fetus delivery: A comparative study. Tunis Med 2011; 89: 553–556.
18. Reem Zeki, JeremyJ.N.Oats, Alexy et.al. Cesarean section and diabetes during pregnancy: An NSW population study using Robson classification. J Obs and Gynae Research2018; 44:809-983.
19. Al Najashi SS, Al Umran KU. Congenital anomalies among infants of diabetic mothers: a study of 466 cases at King Fahd Hospital of the University, Al-Khobar. J Obstet Gynaecol 1997; 17:23–25
20. Verheigen EC, Critchley JA, Whitelaw DC, Tuffnell DJ. Outcome of pregnancies in women with pre-existing type 1 or type 2 diabetes, in an ethnically mixed population. BJOG 2005;112: 1500-3.
21. Ojule JD, Fiebai PO, Okongwu C. Perinatal outcome of macrosomic births in Port Harcourt. Niger J Med 2010; 19:436–440.
22. Alam M, Raza SJ, Sherali AR, Akhter AS. Neonatal complications in infants born to diabetic mothers. J Coll Physicians Surg Pak 2006;16: 212-5.
23. Vangen S, Stoltenberg C, Holan S, Moe N, Magnus P, Harris JR, et al. Outcome of pregnancy among immigrant women with diabetes. Diabetes Care 2003; 26(2): 327-32.
24. Saxena P, Tyagi S, Prakash A, Nigam A, Trivedi SS. Pregnancy outcome of women with gestational diabetes in a tertiary level hospital of north India. Indian J Community Med 2011; 36(2):120-3.
25. Pearson DW, Kernaghan D, Lee R, Penney GS. Scottish Diabetes in Pregnancy Study Group. The relationship between pre-pregnancy care and early pregnancy loss, major congenital anomaly or perinatal death in type 1 diabetes mellitus. BJOG 2007; 114: 104-7.