



Perinatal Outcome among Women with Gestational Diabetes Mellitus

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Abstract

Background & Objectives: Diabetes in pregnancy is associated with an increased risk of complications in both the mother and the fetus. Early diagnosis by the screening of pregnant women between 24 to 28 weeks of gestation with proper control of diabetes is important to reduce the adverse effects in perinatal outcomes. This study aims to know the perinatal outcome among neonates of diabetic mothers in comparison with those of non-diabetic mothers.

Methods: A case control study was carried out at Maternity Teaching Hospital in Erbil City, Kurdistan Region, Iraq over 6 months' period, from 1st April 2019 to 1st Of January 2020. A convenient sample size of 100 participants of diabetic mothers compared with 100 non-diabetic mothers with ≥ 34 weeks of gestation till one week post-delivery, perinatal outcome including gestational age, mode of delivery, admission to neonatal care unit, birth weight, gender, early neonatal death, intrauterine death, the intrauterine fetal restriction was measured in both groups.

Results: Among majority of gestational diabetic mothers regarding to maternal age 33.5% were aged between 18-35 years, 16.5% were older than 35, the most common complications in gestational diabetes group which were statistically significant were hypoglycemia, polycythemia and respiratory distress (17.5%, 13% and 20% respectively) , neonatal macrosomia were revealed in 22.5% of gestational diabetes mellitus neonates and only 10% in non- gestational diabetes mellitus revealed,

Conclusion: Morbidities like hypoglycemia, macrosomia, polycythemia, and respiratory distress syndrome are more common among babies of diabetic mothers when compared to those of non-diabetic mothers, and they are the most common complications that were observed.

Key words: Newborns of diabetic mothers, Gestational diabetes, Hypoglycemia.

Introduction

Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance of variable severity with onset or first recognition during the present pregnancy.¹ Diabetes is one of the most common medical complications of pregnancy, 7–10% of all pregnancies worldwide depends on risk factors, the population and diagnostic criteria.² Considering the fact that prevalence estimates are subject to the diagnosis criteria applied, Middle East and North Africa had the highest prevalence of GDM, estimating 12.9% whereas Europe

had the lowest prevalence with a median range of 5.8%.³ The worldwide epidemic of glucose intolerance, predicted by the latest WHO guideline, will increase the burden of gestational diabetes, especially in the developing countries.⁴ The infant of diabetic mothers (IDMs) is at an increased risk for short and long term morbidities. The classic presentation of an infant of uncontrolled diabetic mother is macrosomia, this occurs as a result of biochemical events on the pathway of maternal hyperglycemia and neonatal hyperinsulinemia. Other complications

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such as hypoglycemia, hypocalcemia, hypomagnesemia, respiratory distress, hyperbilirubinemia, and congenital malformations also commonly occur⁵. Although most of the morbidity and mortality data for the IDMs improved with time, congenital anomalies remain a significant unresolved problem.⁶ There is agreement on the benefits of treating GDM, as untreated gestational diabetes

has been associated with significant risks of perinatal morbidity in all levels of disease severity, and treatment has been associated with reduced perinatal complications and maternal morbidity.⁴ The aim of the study to assess the neonatal outcome of neonates (perinatal morbidity and mortality) among diabetic mothers compared to a group of women without diabetes.

Materials and methods

This study was carried out at Maternity Teaching Hospital in Erbil City, which is the capital of Kurdistan Region in the north of Iraq, from 1st April 2019 to 1st of January 2020. To achieve the aim of the study, a case-control study design was adopted. An agreement from the Research Ethics Committee of the Kurdistan Higher Council of Medical specialties was obtained. Informed consent was taken from the parent of the newborns. The study sample was 200 women who had recently given birth, divided into two groups, the first group included 100 mothers with GDM, and the second group included mothers without GDM. Perinatal outcome including gestational age, mode of delivery, admission to neonatal care unit, birth weight, gender, early neonatal death, intrauterine death, the intrauterine fetal restriction was measured in both groups. Other socio-demographic parameters include age, educational state, occupation, and antenatal care was also recorded. The inclusion criteria for all women who were involved in the current study were singleton pregnant women with a gestational age of ≥ 34 weeks and with GDM for the case group, excluding those who had a history of gout, renal disease, cardiovascular disease (hypertension,

preeclampsia, and eclampsia), multiple pregnancy, liver disease, bleeding disorders, and known case of diabetes mellitus from the study. For neonatal outcome, gender, gestational age, apparent congenital anomaly and birth injury, mode, birth weight, Apgar score in 1st and 5 minutes, admission to neonatal care unit (NCU) and duration of admission has been observed. Macrosomia is defined as birthweight over 4000 g.⁸ Investigations for newborns were done, such as total serum Bilirubin (TSB). Diagnosis of hyperbilirubinemia was made according to the American Academy of Pediatrics to infant age in hours and serum bilirubin level.⁹ Polycythemia was defined as Packed Cell Volume PCV $\geq 65\%$ and hemoglobin value greater than 22 g/dl² and hypoglycemia was defined according to the American academy of pediatrics to a blood glucose <47 mg/dl.³ Chest X-ray in selected cases (those with respiratory distress) were done. Data was analyzed by using the Statistical Package for Social Sciences Program (SPSS) Statistics for Windows, version 25. Descriptive data was compared using Chi-Square to compare proportions, and p-value ≤ 0.05 was considered as statistically significant.

Results

Out of 200 pregnant women there was a significant association regarding residency, age, occupation, and educational state. Regarding to residency,

33% of GDM were from urban areas while 17% were from rural areas. The majority (41.5%) of non-GDM were from urban areas with the significant association in p-

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value 0.006, as shown in Table (1). Majority of mothers age in both groups were between 18-35 years (33.5% of GDM, 41.5 % of non-GDM), and 16.5%

of diabetic mothers were aged more than or equal to 35, while only 8.5% of them was of a non-GDM group (p value=0.009), as shown in Table (1).

Table (1): Distribution of sample according to sociodemographic criteria.

Variables	GDM		Non-GDM		p-value
	No.	%	No.	%	
Age of mother 18-35 ≥35	67 33	33.5 16.5	83 17	41.5 8.5	0.007
Residential status Rural Urban	34 66	17 33	17 83	8.5 41.5	0.005*
Distribution of obesity BMI < 30 kg/m ² BMI ≥ 30 kg/m ²	65 35	32.5 17.5	76 24	38.0 12.0	0.060*
Educational level Illiterate Primary Secondary Higher education	30 42 21 7	15 21 10.5 3.5	22 19 31 28	11 9.5 15.5 14.0	0.000
Occupation Housewife Employed Student	79 21 0	39.5 10.5 0	52 44 4	26 22 2	0.000

Regarding the parity, which revealed significant association, The GDM group was predominantly gravida 3-4 (20.5 %) while the majority of control group were gravida 1-2 (27%). (p-value = 0.002). The

rate of cesarean section was higher in GDM group, about 55 cases (27.5%), and 45(22.5%) delivered normally by vaginal delivery, (p-value = 0.322) as shown in Table (2).

Table (2): Distribution of sample according to parity and mode of delivery of women.

Characteristics	GD		Non-GD		Total		p-value
	No.	(%)	No.	(%)	No.	(%)	
Parity							0.002
1-2	35	17.5	54	27.0	89	44.5	
3-4	41	20.5	38	19.0	79	39.5	
>4	24	12.0	8	4.0	32	16.0	

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Majority of neonates in GDM group was full term 37-41 weeks (32.5%), while in non-GDM was (35.5%), but there were significant associations in observing of neonatal macrosomia were revealed in 22.5% of GD mothers, (p-value > 0.001) as shown in Table (3).

Table (3): distribution of sample according to gestational age.

Characteristics	GD		Non-GD		Total		p-value
	No.	(%)	No.	(%)	No.	(%)	
Gestational age							> 0.655
< 37	34	17	28	14	62	31	
37-41	65	32.5	71	35.5	136	68	
≥41	1	0.5	1	0.5	2	1	
Weight							> 0.001
≤ 2500	17	8.5	24	12	41	20.5	
2500-3.990	38	19	56	28	94	47	
> 4000	45	22.5	20	10	65	32.5	
Total	100	50	100	50	200	(100.0)	

More than half (56.5%) of total neonates were admitted to NCU, nearly a quarter (33.5%) of them were of GD neonates. p-value >0.003, among all the cases of GD neonates only 2 case had gross congenital anomaly with no significant p value in both variables. Hypoglycemia Among neonates of GDM mothers was found in

17.5% which was significantly higher than non-GD neonates (3.5%) p-value > 0.000. Polycythemia was second most common comorbidity in about 13% which revealed a significant association in p-value <0.001, while respiratory distress and hyperbilirubinemia were not statistically significant in both groups, as shown in Table (4).

Table (4): Distribution of sample according to neonatal complications.

Complications		GD		Non-GD		p-value
		No.	%	No.	%	
Hypoglycemia	Yes	35	17.5	7	3.5	0.000
	No	65	32.5	93	46.5	
Respiratory distress	Yes	40	20	26	13	0.025
	No	60	30	74	37	
Hyperbilirubinemia	Yes	51	25.5	44	22	0.198
	No	49	24.5	56	28	
Polycythemia	Yes	26	13	8	4	0.001
	No	74	27	92	46	
Hypoglycemia < 47, hyperbilirubinemia ≥ 5mg/dl, polycythemia PCV ≥ 65%						

The mean of apgar score in 1st and 5th minute of gestational diabetic neonates was lower case group than non-gestational diabetic neonates, there was no significant correlation of apgar score in both 1st minute and 5th minute in both case and control groups. As shown in Table

(5). There was a significant association between case and control groups in 1 and degree of Apgar score in <5 and ≥5 minutes for both 1st and 5th minute as most of cases had low apgar score in both 1st and 5th minute with significant association as shown in Table (5).

Table (5): Apgar score at 1st and 5th minute in x2 test in both cases and controls.

Apgar score			No.	%	p-value
1 st minute	GD	<5	30	15	0.009*
		≥5	70	35	
	Non-GD	<5	15	7.5	
		≥5	85	42.5	
5 th minute	GD	<7	60	30	0.000
		≥7	40	20	
	Non-GD	<7	22	11	
		≥7	78	39	

*fishers exact test

Discussion

Gestational diabetes mellitus is a common problem in pregnancy; neonates of women with GDM are at increased risk of complications. In this study, maternal age has a strong relationship with gestational diabetes as its prevalence increases with advanced maternal age. GDM mothers aged ≥35 were about 16.5% as compared to non-GDM mothers who were only 8.5%. Similar studies were found to support this finding by Erem C et al were GDM mothers aged ≥35 was 9.5% and 0.7% were aged <20 years.¹² Regarding the parity, in the current study, 32.5% of cases were multiparous while only 23% of non-GDM mothers were multiparous, which is consistent to a study done by Kheir et al identified 59.7% of mothers that had gestational diabetes were multiparous⁶. Increasing parity was well demonstrated as an associated risk factor for GDM, this is also supported by a study done by Priyanka et al.¹³ Majority of GDM in the present study delivered by the caesarian section (27.5%) while 26% of

non-GDM mothers delivered by vaginal delivery, and the results were parallel to a study done by Kheir et al⁶. In contrast to a study done by Priyanka that shows majority (73.33%) was vaginal, only 19.44% were delivered by caesarian section¹³. As expected in the present study, preterm delivery was more in neonates with GDM than those pregnant in non-GDM group (17% and 14%, respectively), same findings were found in Saudi women by Gasim et al 11.4% was preterm in GDM neonates and 5% in non-GDM.¹⁴ while it's inconsistent to the result of a study done in turkey by Erem C in which majority of neonates were term infants (83.8%)¹². Macrosomia remains important morbidity because it is associated with increased risk for traumatic birth injury, obesity, and diabetes in later life. Although some of the variation in incidence may be related to definition, most authors agree that macrosomia is in part related to maternal glucose control.^{6, 12, 15} The findings in this study that clarified the rate

of macrosomia were 22.5% in GDM neonates and 10% in control group, which is inconsistent with a study done by Priyanka et al in which only 3.88% cases were macrosomia and result was not significant.¹³ The Apgar scores were not strikingly different between the two groups studied; but there was a significant improvement in Apgar score in 1st and 5 minutes. Among neonatal complications, hypoglycemia was the most common finding 17.5% that is significant, neonatal hypoglycemia has been identified as a

Conclusion

Gestational diabetes is a risk factor for many morbidities and complications in both mothers and neonates. Morbidities such as hypoglycemia, polycythemia and respiratory distress syndrome are more common among babies of diabetic mothers when compared to those of non-diabetic mothers. Because of the high frequency of

Conflicts of interest

The author reports no conflicts of interest.

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marker of poor glycemic control in the mothers. In the present study, respiratory distress was found in 20% of GDM neonates and is significantly higher than neonate of NGD mothers, which is similar to the results of a study done by Salima et al.¹⁶ However, hyperbilirubinemia is a recognized problem of infants of diabetic mothers but in our study the finding was not statistically significant, similar to that done by Kheir et al⁶, but inconsistent to result of study that was done by Islam.¹⁷

these complications, screening for hyperglycemia in mothers early in pregnancy, referring women with unstable metabolic control to specialized diabetes centers and meticulous monitoring in babies will improve both pre and postnatal outcomes.

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