Clinical Outcomes of Teenage Pregnant Women with Gestational Diabetes Mellitus (GDM) at a Tertiary Hospital in Quezon City

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Abstract

Objectives: This study aimed to determine the maternal and fetal effects of hyperglycemia, and to compare the clinical outcomes between pregnant teenagers and adult women with gestational diabetes mellitus (GDM).

Methodology: This was a retrospective cohort study among pregnant women who tested positive for GDM by 75-gram oral glucose tolerance test (OGTT). Data was collected from the 1st of January 2015 to the 31st of December 2019. Maternal and fetal outcomes and the factors associated with maternal and neonatal outcomes among teenage women and adult women with GDM were studied.

Results: A total of 254 charts of women with GDM were reviewed. Overall, adverse maternal outcomes were found in 94.12% and 90% of teenage and adults, respectively; and were almost more likely among primigravida (OR=3.984, CI=1.32-12, *p=0.014*). The study also showed less probability of having adverse maternal outcomes among multipara and grand multipara women (OR=0.2545, CI=0.08-0.79, P=0.018 and OR=0.1091, CI=0.03-0.45, *p=0.002*) respectively. Adverse neonatal outcomes were more likely among women who had prior delivery of macrosomic baby (OR=21.9091, CI=1.28-3.73, P=0.033). No adverse fetal outcome records were seen among teenage mothers, while adult women had 5.45% incidence.

Conclusion: Adverse maternal and neonatal outcomes were not significantly higher in the teenage GDM population compared to adult GDM. However, diagnosing and managing GDM among these groups would be beneficial considering their life expectancy and the need for a lifelong preventive program to avoid future development of Type 2 DM (T2DM) and its complications.

Keywords: Teenage pregnancy, Gestational diabetes mellitus, Risk factors

Introduction

Pregnancy is associated with resistance to insulin action which becomes apparent during the second trimester and increases progressively to term. The physiologic changes in insulin resistance facilitate the transport of glucose across the placenta to ensure normal fetal growth and development. However, maternal hyperglycemia occurs if resistance to maternal insulin action is markedly pronounced, then, a diagnosis of gestational diabetes mellitus (GDM) can be made.[1]

The onset of glucose intolerance during the second and third trimesters of pregnancy is known as GDM. According to the International Association of Diabetes and Pregnancy Study Groups (IADPSG) a pregnant woman is diagnosed with GDM if any one of the following plasma glucose values is equal to or exceeds the specified thresholds during oral glucose tolerance test (OGTT) – fasting plasma glucose ≥ 92 mg/dL (≥ 5.1 mmol/L), 1-hour plasma glucose ≥ 180 mmol/dL (≥ 10.0 mmol/L), 2-hour plasma glucose ≥ 153 mmol/dL (≥ 8.5 mmol/L).[2] GDM has been associated with adverse maternal outcomes such as preeclampsia, caesarean delivery, and pre-term birth, and neonatal complications including macrosomia, birth trauma, hypoglycemia, jaundice and respiratory distress syndrome.[3,4]

The Asian Federation of Endocrine Societies Study Group on Diabetes in Pregnancy (ASGODIP) showed that the Philippines has a 14% prevalence of GDM. About 40.4% of high-risk women were GDM when screened beyond the 26th week of pregnancy. A study done at the University of Santo Tomas Hospital identified 7.5% prevalence of GDM.[3,5] Hence, the Unite for Diabetes

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Clinical Practice Guideline (CPG) recommends universal screening for Filipino pregnant women during the first prenatal visit for risk factors for diabetes, which include age ≥ 25 years old; overweight or obese prior to pregnancy; history of abnormal glucose metabolism; prior poor obstetric outcome which include abnormal glucose tolerance, macrosomia (>8lbs), congenital malformations, recurrent abortions, and unexplained intrauterine death; first-degree history of diabetes; intake of drugs affecting carbohydrate metabolism; and glucosuria. Routine laboratory testing is recommended at 24-28 weeks age of gestation, but among high-risk women, screening should be done as soon as possible using 75-g OGTT.[6]

Pregnancy in a female occurring under the age of 20 is defined as teenage pregnancy, also known as adolescent pregnancy. It has become a global problem in high, middle- and low-income countries; and more likely among marginalized communities driven by poverty, lack of education and unemployment.[7] The Philippine Statistics Authority (PSA) reported in 2014 that one in every ten young Filipino women age 15-19 has begun childbearing. It is more common among teens with elementary education (44%) as compared with women who had college education (21%); and 37% belonging to low socioeconomic status.[8] According to the most recent National Demographic Health Survey (NDHS) in 2017, 9% of women start conceiving at the ages 15 of 19 years. Hence, teen pregnancy has become a national social emergency in the Philippines.[9]

Pregnant women aged 35, especially those at 45 and above, are more likely to experience gestational diabetes with associated maternal complications including placenta previa, breech presentation, preeclampsia, gestational hypertension, preterm and caesarean delivery compared to younger women aged 20-29.[10] Likewise, at a younger spectrum of reproductive age, that is, pregnancy below 20 years carries the same risk of adverse outcomes.[11]

A retrospective study conducted in a community-based teaching hospital in Turkey among 1653 teenage pregnant women (≤19 years) who were screened between the period of 2005-2007 showed a 0.85% prevalence of GDM. Sixty-eight percent of patients had at least one of the risk factors including body mass index (BMI) ≥25, family history of diabetes, and polycystic ovary syndrome (PCOS). A fraction (9.1%) required insulin for glucose regulation during pregnancy. Data also showed the median birth weight was 3500gms, with 9.1% rate of macrosomia, and a caesarean delivery rate of 27.3%.[12] Another retrospective cohort study done in a publicly funded regional hospital in Hong Kong regarding obstetric characteristics and outcomes of teenage pregnancies, involving 7658 primigravid deliveries of which 5.1% (394) are teenage pregnancies from 2006 to 2008 showed that there is a higher rate of preterm labor and premature delivery attributed to higher frequencies of anemia, pregnancy-induced hypertension and infections. Results showed that teenagers delivered more low-birth-weight babies (<2500 grams).[13]

In another retrospective case-control study done on 611 Asian pregnant teens for a 4-year period from 1993-1996, GDM was identified among 33 subjects (5.4%). Clinical outcomes showed a higher incidence of postpartum hemorrhage with greater amount of estimated blood loss at delivery and a trend towards having a large-for-gestational age infant. Also, a higher incidence of neonatal unit admission mostly due to meconium-stained liquor and a lower first minute Apgar score were observed. There was no difference in maternal height, weight, gestational weight gain, BMI, or the incidence of major antenatal complications. The incidence of spontaneous labor and caesarean delivery were similar, but the incidence of instrumental delivery was almost double in the study group. However, this did not reach statistical significance.[14]

According to the Vital Statistics Report released by the National Statistics Office (NSO) in 2008, there were a total of 1,784,316 registered births; of these, 10.4% (186,527 births) were born to mothers under 20 years of age. In 2017, an estimated 538 babies were born to Filipino teenage mothers every single day. Moreover, the Philippines has the second highest rate (about 5.99%) of teenage pregnancy in Southeast Asia based on the 2019 Save the Children's Global Childhood Report.[15] Local data in Quezon City reported a 2.5% teenage pregnancy rate.[16]

Although there are local studies on the prevalence and risk factors of GDM that have already been published, but with the recent increase in the rate of teenage pregnancy, a remarkable occurrence of GDM among adolescents are also encountered. However, there is paucity of local data regarding the clinical outcomes of GDM among teenage pregnancies. They are considered a vulnerable population due to their physical, emotional, and socio-economic immaturity. The combination of GDM and teenage pregnancy may create a complex interplay of factors that can influence pregnancy outcomes and long-term health implications for both the mother and the child.

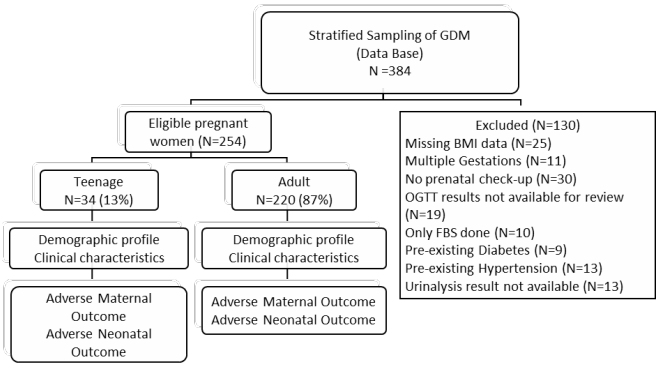

Figure 1. Study participant flow of screening and inclusion process.

Table I. Distribution of Women with Gestational Diabetes According to Demographic Characteristics.

	Total (n=254)	Teenage (n=34, 13%)	Adult (n=220, 87%)	P-value
	Frequency (%); Mean ± SD			
Age	26.75 ± 6.8	17.82 ± 1.19	28.13 ± 6.24	<0.001
Marital Status				<0.001
Single	201 (79.13)	34 (100)	167 (75.91)	
Married	53 (20.87)	0	53 (24.09)	
Educational attainment				<0.001
Primary	7 (2.76)	5 (14.71)	2 (0.91)	
Secondary	183 (72.05)	28 (82.35)	155 (70.45)	
College Undergraduate	56 (22.05)	1 (0.39)	55 (25)	
College Graduate	8 (3.15)	0	8 (3.64)	
Employment				0.122
Non-employed	229 (90.16)	34 (100)	195 (88.64)	
Part-time employee	19 (7.48)	0	19 (8.64)	
Full-time employee	6 (2.36)	0	6 (2.73)	

Table II. Clinical Characteristics of Teenage and Adult Women with Gestational DM.

	Total (n=254)	Teenage (n=34, 13%)	Adult (n=220, 87%)	P-value
	Frequency (%); Mean ± SD			
BMI at first diagnosis of GDM				
<18.5 (Underweight)	0	0	0	0.713
18.5-22.9 (Normal)	181 (71.26)	26 (76.47)	155 (70.45)	
23-24.9 (Overweight)	59 (23.23)	6 (17.65)	53 (24.09)	
≥25.9 (Obese)	14 (5.51)	2 (5.88)	12 (5.45)	
Gravidity				<0.001
Primigravida	106 (41.73)	30 (88.24)	76 (34.55)	
Multigravida	148 (58.27)	4 (11.76)	144 (65.45)	
Parity				<0.001
Primipara	114 (44.88)	32 (94.12)	82 (37.27)	
Multipara	120 (47.24)	2 (5.88)	118 (53.64)	
Grand multipara	20 (7.87)	0	20 (9.09)	
Laboratory results at baseline				
75gm OGTT mean				
FBS: 92 mg/dl	93.37 ± 17.25	92.97 ± 20.23	93.43 ± 16.79	0.884
1hr: ≥180 mg/dl	179.5 ± 34.9	167.12 ± 30.7	171.07 ± 35.5	0.541
2hr: ≥153 mg/dl	145.5 ± 34.90	154.90 ± 34.3	144 ± 34.84	0.092
Presence of Glucosuria	13 (5.12)	4 (11.76)	9 (4.09)	0.079
Prior history				
GDM	4 (1.57)	0	4 (1.82)	1.000
Delivery of macrosomic baby (>8lbs)	2 (0.79)	0	2 (0.91)	1.000
Family history				
First degree relative with T1DM	0	0	0	-
First degree relative with T2DM	29 (11.42)	1 (2.94)	28 (12.73)	0.144
Insulin therapy during pregnancy	13 (5.12)	3 (8.82)	10 (4.55)	0.392

With the challenges and increasing burden of the condition, this study aims to determine the maternal and fetal effects of hyperglycemia, and to compare the clinical outcomes between pregnant teenagers and adult women with GDM. By examining a cohort of teenage pregnant with GDM, we intend to provide valuable insights into the aspects of GDM in this specific population. This will help heightened surveillance; offer extensive education and preventive strategies; improve the management and care provided to this vulnerable population to reduce the risk of developing maternal and fetal complications; lastly, to enhance the overall health outcomes of both young mothers and their offspring.

Methodology

The study was approved by the Institutional Ethics Review Board of East Avenue Medical Center (EAMC).

The case records of all pregnant women who were diagnosed to have GDM based on the IADPSG for the period of January 1, 2015 to December 31, 2019 were obtained and reviewed. Only those who delivered at EAMC were included.

A minimum of 114 hyperglycemic pregnant women were required for this study based on 8% prevalence of neonatal care admission among population with the same condition. This computation accounts for 5% level of significance and 10% desired width of the confidence

Table III. Association of Adverse Maternal and Neonatal Outcomes with Age.

	Total (n=254)	Teenage (n=34)	Adult (n=220)	p-value	Odds ratio (95% CI) *	p-value
	Frequency (%)					
Adverse maternal outcome						
Ante partum hemorrhage	1 (0.39)	0	1 (0.45)	1.000	-	-
Preeclampsia and Eclampsia	7 (2.76)	1 (2.94)	6 (2.73)	1.000	1.0808 (0.13 - 9.26)	0.943
Polyhydramnios	4 (1.57)	0	4 (1.82)	1.000	-	-
Induction	32 (12.6)	5 (14.71)	27 (12.27)	0.780	1.2324 (0.44 - 3.46)	0.691
Augmentation	41 (16.14)	5 (14.71)	36 (16.36)	1.000	0.8812 (0.32 - 2.43)	0.807
Premature rupture of membrane	3 (1.18)	0	3 (1.36)	1.000	-	-
Instrumentation	8 (3.15)	0	8 (3.64)	0.602	-	-
Caesarean section	68 (26.77)	9 (26.47)	59 (26.82)	0.483	2.135 (0.41-11.03)	0.365
Perineal laceration	152 (59.84)	23 (67.65)	129 (58.64)	0.159	2.556 (0.5 -11.59)	0.224
Prolonged hospital stay	2 (0.79)	2 (5.88)	0	0.017	-	-
Maternal mortality	0	0	0	-	-	-
Overall Maternal Outcomes	230 (90.55)	32 (94.12)	198 (90)	0.751	1.7778 (0.40 - 3.93)	0.451
Adverse neonatal outcome						
5-min Apgar score less than 7	2 (0.79)	0	2 (0.91)	1.000	-	-
Stillbirth	2 (0.79)	0	2 (0.91)	1.000	-	-
Neonatal Hypoglycemia	2 (0.79)	0	2 (0.91)	1.000	-	-
Neonatal Hyperbilirubinemia	6 (2.36)	0	6 (2.73)	1.000	-	-
Shoulder dystocia	1 (0.39)	0	1 (0.45)	1.000	-	-
Meconium staining	0	0	0	-	-	-
Cord coil	2 (0.79)	0	2 (0.91)	1.000	-	-
Neonatal ICU admission	1 (0.39)	0	1 (0.45)	1.000	-	-
Neonatal death	2 (0.79)	0	2 (0.91)	1.000	-	-
Overall Neonatal Outcomes	12 (4.72)	0	12 (5.45)	0.378	-	-

** - Adult pregnant women as reference group*

interval. Consecutive charts of all pregnant teenagers (range 12 to 19 years old) with GDM were included for as long as outcomes were recorded, while random sampling was done for the adult with GDM until the sample size was reached. Comparison was made between teenage and adult GDM including demographic and clinical characteristics for the development of GDM including measures of adiposity, 75-gm OGTT results, presence of glucosuria, prior history of GDM, prior delivery of macrosomic babies (>8lbs), presence of family history (first degree relatives) of diabetes, gravidity, parity, and the use of insulin therapy during pregnancy.

Adverse maternal outcomes were assessed including the presence of one or more of the following: antepartum hemorrhage, preeclampsia and eclampsia, polyhydramnios, induction, augmentation, premature rupture of membrane (PROM), instrumentation, caesarean section (CS), perineal laceration, prolonged hospital stay, and maternal mortality. Adverse neonatal outcomes were defined as having one or more of the following: 5-min Apgar score under 7, stillbirth, hypoglycemia, hyperbilirubinemia, shoulder dystocia, meconium staining, cord coil, intensive care unit (ICU) admission, and neonatal death (during hospital stay) were reviewed. A flow chart describing the inclusion and exclusion of the subjects used for this study is shown in *Figure 1*.

Inclusion criteria:

1. Any pregnant woman diagnosed to have GDM using the International Association of Diabetes and Pregnancy Study Group (IADPSG) criteria from the year 2015-2019;
2. Delivered at EAMC during that period;
3. With complete data including maternal and neonatal outcomes.

Exclusion criteria:

1. Pregnancy with pre-GDM or diagnosed Type 1 or Type 2 diabetes prior to pregnancy.
2. Pregnancy with other medical comorbidities.
3. Multiple pregnancy.
4. No prenatal check-up.

Statistical analysis. Descriptive statistics was used to summarize the demographic and clinical characteristics of the patients. Frequency and proportion were used for categorical variables, median and inter quartile range for non-normally distributed continuous variables, and mean and SD for normally distributed continuous variables. Independent Sample *t-test* and *Fisher's exact test* were used to determine the difference of mean and frequency, respectively, between teenage and adult pregnant women with GDM. Odds ratio and corresponding 95% confidence intervals from binary logistic regression was computed to determine

Table IV. Factors Associated with Adverse Maternal Outcomes Among Teenage Women and Adult Women with Gestational DM.

Parameters	Odds ratio	95% CI	p-value
Age			
< 20 years old	1.7777	0.40- 7.93	0.451
≥ 20 years old	(reference)	-	-
BMI			
Underweight (<18.5)	-	-	-
Normal (18.5-22.9)	(reference)	-	-
Overweight (23-24.9)	0.5422	0.11- 2.65	0.450
Obese (≥24.9)	0.6713	0.26- 1.74	0.411
Gravidity			
Primigravida	3.9844	1.32- 12	0.014
Multigravida	(reference)	-	-
Parity			
Primipara	(reference)	-	-
Multipara	0.2545	0.08- 0.79	0.018
Grand multipara	0.1091	0.03- 0.45	0.002
Presence of Glucosuria	0.3182	0.08- 1.25	0.100
Prior history			
GDM	0.3040	0.03- 3.04	0.311
Delivery of macrosomic baby (>8lbs)	0.1004	0.01- 1.66	0.108
Family history			
First degree relative with T1DM	-	-	-
First degree relative with T2DM	1.4631	0.33- 6.57	0.620
Insulin therapy during pregnancy	-	-	-

significant factors of maternal and neonatal outcome in teenage and adult pregnant women with GDM. All statistical tests were two-tailed tests. *Shapiro-Wilk* was used to test the normality of the continuous variables. Missing values were neither replaced nor estimated. Null hypotheses were rejected at *p>0.05* α-level of significance. STATA 13.1™ was used for data analysis.

Results

A total of 254 GDM patients were included in a 5-year retrospective study. Among these were 34 teenagers who fulfilled the inclusion criteria which accounted for 13% of the study group, while the remaining 220 (87%) were adult GDM.

The mean age was 17.8 (range 12 to 19) years and 28.1 (range 20 to 35) years in the teenage and adults, respectively. All teenaged women (100%) and most adults (75.91%) were single. Majority of teenagers and adults had some level of secondary education at 82.35% and 70.45%, respectively. However, a smaller proportion of teenage attained college level compared to adults (0.39% vs 25%). Among the variables, age (*p<0.001*), marital status (*p<0.001*), and educational attainment (*p<0.001*) showed statistically significant difference in the distribution of cases in relation to age groups, while employment did not show statistical significance (*Table I*).

As shown in *Table II*, gravidity (*p<0.001*) and parity (*p<0.001*) showed a significantly different distribution in relation to age group. Teenagers had more primigravid and primipara, 88.24% and 94.12%, respectively, while adult subjects were more multigravid and multiparous, at 65.45% and 53.64% respectively. The measures of adiposity based on BMI, result of 75g OGTT, glucosuria, history of GDM, prior delivery of a macrosomic baby, family history of T1DM or T2DM among first degree relative, and the use of insulin during pregnancy did not show statistically significant difference in both age groups.

Patient outcomes are shown in *Table III*. Overall adverse maternal outcomes were 94.12% and 90% among teenage and adults, respectively. Teenagers had more cases of prolonged hospital stay (*p<0.017*), are more likely to develop preeclampsia (OR=1.08, 95%CI=0.13-9.26, *p=0.943*) and induction (OR 1.23, 95%CI=0.44-3.46, *p=0.691*) and twice more likely to undergo CS (OR=2.135, 95%CI=0.41-11.03, *p=0.365*) and to have perineal laceration (OR=2.556, 95%CI=0.5-11.59, *p=0.224*) but these were not statistically significant. There were no adverse neonatal outcomes seen among teenagers, while 5.45% of adult women had adverse neonatal outcomes. Among these, six had neonatal hyperbilirubinemia (2.73%), two had a 5-min Apgar score less than 7 (0.91%), there were two stillbirths (0.91%), two had neonatal hypoglycemia (0.91%), two incidence of cord coil and neonatal death (0.91%). There was one incidence of shoulder dystocia (0.45%) and one needed neonatal ICU (NICU) admission (0.45%). However, there were no significant difference in terms of maternal and neonatal outcomes in both groups.

Table IV significantly showed that primigravida has four times greater odds (OR=3.9844, 95%CI=1.32-12, *p=0.014*) of having adverse maternal outcomes, and on the opposite extreme, being multiparous, especially grand multipara (OR=0.1091, 95%CI=0.03-0.45, *p=0.002*), was associated with decreased odds of having

Table V. Factors Associated with Adverse Maternal Outcomes Among Teenage Women and Adult Women with Gestational DM.

Parameters	Odds ratio	95% CI	p-value
Age			
< 20 years old	-	-	-
≥ 20 years old	(reference)	-	-
BMI			
Underweight (<18.5)	-	-	-
Normal (18.5-22.9)	(reference)	-	-
Overweight (23-24.9)	-	-	-
Obese (≥24.9)	0.2665	0.03- 2.11	0.210
Gravidity			
Primigravida	0.9972	0.31- 3.23	0.996
Multigravida	(reference)	-	-
Parity			
Primipara	(reference)	-	-
Multipara	0.7826	0.23- 2.64	0.693
Grand multipara	0.9474	0.11- 8.32	0.961
Presence of Glucosuria	4.2000	0.82- 21.5	0.085
Prior history			
GDM	-	-	-
Delivery of macrosomic baby (>8lbs)	21.9091	1.28- 3.73	0.033
Family history			
First degree relative with T1DM	-	-	-
First degree relative with T2DM	1.5926	0.33- 7.66	-
Insulin therapy during pregnancy	1.7424	0.21- 14.6	0.609
BMI			
Underweight (<18.5)	-	-	-
Normal (18.5-22.9)	(reference)	-	-
Overweight (23-24.9)	-	-	-
Obese (≥24.9)	0.2517	0.03- 1.99	0.192
Gravidity			
Primigravida	1.3783	0.42- 4.50	0.595
Multigravida	(reference)	-	-
Parity			
Primipara	(reference)	-	-
Multipara	0.5603	0.17- 1.90	0.353
Grand multipara	0.6667	0.08- 5.87	0.715
Presence of Glucosuria	5.7400	1.05- 31.3	0.043
Prior history			
GDM	-	-	-
Delivery of macrosomic baby (>8lbs)	18.8182	1.10- 32.1	0.043
Family history			
First degree relative with T1DM	-	-	-
First degree relative with T2DM	1.4000	0.29- 6.75	0.675
Insulin therapy during pregnancy	2.0101	0.23- 17.3	0.525

adverse maternal outcomes. Whether teenager or adult GDM, being primigravid leads to greater odds of adverse maternal outcomes. Younger age (or being a teenager), having an elevated BMI, glucosuria, a history of GDM and delivery of a macrosomic baby, and having a first degree relative with GDM were not significantly associated with adverse maternal outcomes.

Adverse neonatal outcomes in GDM (*Table V*) were almost 22 times more likely among women who had prior delivery of macrosomic baby (OR=21.9091, 95%CI=1.28-3.73, *p=0.033*). Among adult women with GDM (*Table VI*), adverse neonatal outcomes were associated with the presence of glucosuria with almost six times likelihood (OR=5.7400, 95%CI=1.05-31.3, *p=0.043*), and those with history of macrosomic baby with 18 times probability (OR=18.8182, 95%CI=1.10-32.1, *p=0.043*).

Discussion

This study determined the maternal and neonatal effects of hyperglycemia in the teenage and adult population with GDM. In previous reports, the occurrence of GDM have been linked to presence of glucosuria, history of GDM, prior delivery of a macrosomic baby, family history of diabetes, and insulin therapy during pregnancy.[17,18] When we compared the teenage and adult populations, our data showed that this association was not evident among teenage GDM, however, adult GDM may have at

least one of these risk factors. This may be correlated with a lesser teenage to adult pregnant ratio in the study.

The present study found a high rate of CS among teenage mothers. Cephalopelvic disproportion was shown to be the leading indication for CS in this group followed by associated medical disorders like preeclampsia and eclampsia. Higher risk of induction, perineal laceration and prolonged hospital stay were also observed. Socioeconomic factors including the lack of paternal involvement among these population and inadequate prenatal care were thought to explain the higher incidence of these adverse outcomes which were also reported in other studies.[19,20] These findings, however, did not show significant difference in comparison to the adult group. Common risk factors observed among the two groups include overweight, primigravid, primipara, presence of glucosuria, first degree relative with diabetes, and the use of insulin therapy during pregnancy.

Adverse neonatal outcomes in adult GDM have been established in several reports.[17,20-22] Neonatal outcomes in the adult study group include cases of neonatal hyperbilirubinemia, 5-min Apgar score below 7, stillbirths, neonatal hypoglycemia, cord coil, shoulder dystocia and NICU admission, and incidences of neonatal death related to neonatal sepsis.

A study among GDM in teenage population showed increased perinatal morbidity associated with prematurity, meconium-stained liquor, sepsis, and phototherapy. Among these, meconium-stained showed statistical significance for NICU admission. However, there was no reported serious morbidity nor mortality.[23] In another study, the increase incidence of adverse neonatal outcome was significantly associated with higher rates of preterm births, while the risk of neonatal mortality was independently associated with gestational age at birth.[24] Surprisingly, we found no significant findings of adverse neonatal outcomes in teenage pregnancy in this study. The reason for these remains unclear but may be inherently due to the lower proportion of teenage mothers and may therefore have had some bearing on the occurrence of the outcomes in the study group.

Limitations

The study was done at a single center, and teenage GDM are relatively rare compared to adult GDM. This limited sample size made it challenging to conduct large-scale studies and obtain statistically significant results. The study only involved review of the patient's record, and in some cases, teenage pregnancy often faces additional barriers in adhering to medical advice and prenatal care leading to incomplete medical records or missing data. This lack of comprehensive data may have caused hindrance in evaluating important maternal and neonatal outcomes among the study group.

Conclusion

The present study was an attempt to throw light on the maternal and fetal effects of hyperglycemia among pregnant women particularly in the teenage group. Findings of this study showed that either teenage or adult primigravid GDM were likely associated with having adverse maternal outcomes and multipara women were not associated with adverse maternal outcomes. Pregnant women who had a prior macrosomic baby have a higher likelihood of having adverse neonatal outcomes. Although there were no significant findings of adverse maternal and neonatal outcomes in the teenage study group, diagnosing and managing GDM among these population would be beneficial considering their life expectancy and the need for a lifelong preventive program to avoid the development of T2DM and its complications.

Therefore, we recommend that a prospective, multicenter study of GDM in teenage pregnancy, including the influence of antenatal factors and interventions on maternal and neonatal outcomes among these age groups are greatly needed and should be further investigated. In general, GDM in teenage and adult is associated with adverse outcomes hence by understanding the similarities and differences, healthcare providers can tailor their approach to care, leading to improved maternal and fetal outcomes for both populations. It is important to prevent its occurrence by timely screening, improving education and socio-economic conditions, public awareness, nutrition and access to family planning methods.

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