ORIGINAL ARTICLE

Technology and Pregnancy

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Introduction

DIABETES IN PREGNANCY presents in different ways. A patient may have new-onset diabetes of pregnancy with no past medical history or they may be a type 1 diabetes patient who has had the condition for years. Although the effect of diabetes and pregnancy on the mother may be variable depending on the extent of microvascular and neuropathic disease that is already present, the negative effects on the newborn are more predictable and preventable. Diabetes in pregnancy is very treatable, but it does require close supervision throughout the pregnancy.

In the diabetic mother, a number of complications can arise during pregnancy. Diabetic retinopathy can worsen (1). Proteinuria may become more severe and reductions in creatinine clearance may progress (2). There is an increased prevalence of pre-eclampsia (3). There is increased incidence of thyroid dysfunction and atherosclerosis. There may be an increase in the risk of development of infection.

Diabetes in pregnancy unfortunately affects more than just the mother. Numerous complications arise in the fetus, neonate, and possibly beyond. The risk for congenital malformations is doubled when hyperglycemia is uncontrolled in the first trimester (4). This leads to increased risk of spontaneous abortion. Babies are often macrosomic and are prone to shoulder dystocia and perinatal asphyxia. There is an increased chance of needing a cesarean section with macrosomia. Polyhydramnios is more common in diabetic pregnancies (5). Pregnancies are more likely to be preterm in diabetes (6). There is evidence that offspring of diabetic mothers are prone to developing metabolic syndrome and obesity as they age (7).

Diabetes in pregnancy is becoming more common, likely reflecting the obesity epidemic and improved screening. It is more common in Native Americans, Hispanics, and African Americans when compared to white females (8). A current estimate for the prevalence of gestational diabetes is approximately 10% (9).

Technology continues to advance all areas of healthcare and this is also true in pregnancy complicated by diabetes.

Ultrasound continues to be assessed for its accuracy in predicting complications of gestational diabetes. New ways to assess risk and screen for gestational diabetes are being explored.

An extensive review of the literature from July 2011 to June 2012 was done on diabetes in pregnancy and the technology to diagnose and treat it. What follows are 12 articles that these authors felt were most significant over that time-frame and that demonstrate advancement in the diagnosis and treatment of this disease. The goal is to provide a better understanding of diabetes in pregnancy so that we may all prevent complications in pregnant diabetic females, provide more effective treatment and achieve safer outcomes.

Treatment of gestational diabetes mellitus: glyburide compared to subcutaneous insulin therapy and associated perinatal outcomes

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Objective

The safest and most effective way of treating gestational diabetes mellitus (GDM) is still being investigated. Insulin has always been the first line in treatment since it does not cross the placenta. Recently, increasing studies have come out supporting the use of second-generation sulfonylureas for effective glycemic control. Preliminary studies indicated that glyburide is equal to insulin in achieving glycemic control but

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leads to increased macrosomia and hyperbilirubinemia. In this study, the authors wanted to further investigate perinatal outcomes when using glyburide compared to insulin.

Methods

This was a retrospective cohort study of patients enrolled in the Sweet Success California Diabetes and Pregnancy Program (CDAPP) who delivered between January 1, 2001 and December 31, 2004. Of the 10,682 that needed medical therapy, 2,073 received glyburide and 8,609 were treated with subcutaneous insulin. Patient demographics within each group were analyzed. Data on perinatal outcomes were collected, including cesarean section delivery, macrosomia, and admission to neonatal intensive care unit (NICU). Data was compared using chi-square testing and multivariable logistic regression analysis.

Results

Glyburide treatment was used more often in African-American and Asian women. Women taking glyburide were found to have higher likelihood of having infants with macrosomia and admission to the NICU. In the glyburide treatment group, worse outcomes were present regardless of GDM being diagnosed before or after 24 weeks gestation. The number needed to treat with glyburide to avoid one case of macrosomia is 30.

Conclusions

This study adds support to glyburide administration resulting in worse perinatal outcomes such as macrosomia and admissions to the NICU. Despite these worse outcomes, there is increasing prevalence of treatment with oral hypoglycemic drugs, particularly glyburide.

Comment

Approximately one half of the patients in the study who were in the oral treatment group were labeled as "oral hypoglycemic agent" in the chart, and it is not certain that they received glyburide. The authors make an assumption that glyburide was the oral agent chosen when it could have been another oral agent. This makes the comparison of insulin to glyburide less reliable. Secondly, some of the patients in the trial were designated to their treatment modality based on their last office visit. Even if a patient started off as diet controlled and then was subsequently switched to glyburide and then insulin, that patient would be designated to the insulin group. This means that the course of treatment within the treatment groups may be highly variable. A large, randomized, double-blinded study would help to eliminate the concern for bias. Despite these flaws in the study, the data reminds us to tread carefully when moving away from insulin as the first-line treatment for gestational diabetes.

Skin tag and acanthosis nigricans: do they have a predictive value for gestational diabetes mellitus?

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Exp Clin Endocrinol Diabetes 2011; **119**: 419–22

Objective

Early detection and treatment of gestational diabetes (GDM) will lead to better outcomes for the mother and the fetus. For years, acanthosis nigricans (AN) and skin tags (ST) have been thought to be more common in diabetic patients. This study aimed to compare the risk of GDM in pregnant women with AN and/or ST, which has not been investigated.

Methods

This was a cross-sectional study where 249 women without risk factors for GDM had dermatologic examination at the first antenatal visit. All women went on to have a 50-g glucose screening test and, if positive, a 100-g oral glucose tolerance test. GDM was diagnosed according to American Diabetes Association criteria. The correlation between dermatological findings and GDM were then analyzed. Those with and without dermatological findings were compared via chi-squared testing.

Results

Among all women screened, 24.1% had ST, 11.8% had AN, and 10.5% had both. GDM was diagnosed in 35.8% of women with AN compared to 9.2% for those with normal skin exam. The probability of a pregnant patient having GDM when they have AN is 5.5 times more likely than those without it. GDM was diagnosed in 40% of women with AN and ST compared to 12.3% in those free of AN and ST. The probability of pregnant women having GDM is 4.8 times more likely in women having AN and ST compared to those without them.

Conclusions

Insulin is a growth factor and ultimately leads to hyperplasia of the skin. AN and AN plus ST may be risk factors for GDM. These physical exam findings should prompt early screening and suspicion for GDM. Larger studies are needed.

Comment

This study serves as a reminder that the physical exam can be an effective tool to screen early for GDM. Looking for AN and ST is easy and cheap. Pertinent exam findings should always be looked for wherever possible in medicine. In an era where healthcare costs are rising, we need to be aware of simple measures that can cut costs. In addition, early detection of gestational diabetes will lead to better outcomes for the mother and newborn. Identifying those at risk for GDM is the first step in treating it.

Antenatal hemoglobin A1c and risk of large-for-gestational-age infants in a multi-ethnic cohort of women with gestational diabetes

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Paediatr Perinat Epidemiol 2012; **26**: 208–17

Objective

Women with gestational diabetes (GDM) have 3.4 times higher odds of delivering a large-for-gestational-age (LGA) infant compared with women without GDM. This study aimed to test if there is a correlation between hemoglobin A1C (A1C) level at diagnosis of GDM and risk for LGA infant or macrosomia.

Methods

This was a retrospective cohort study involving 502 women from two healthcare clinics in Charlotte, North Carolina. The initial A1C reading was taken within four weeks of GDM diagnosis and then throughout the pregnancy. A1C level was assigned a quartile rank, from one to four, depending on how high it was. Logistic regression was used to examine for an association across these quartiles of A1C for risk of LGA or macrosomia. Treatment modality (diet, glyburide, insulin, metformin, or combination therapy) and gestational week at delivery were also recorded. Fasting glucose goal and postprandial glucose goals were less than 90 mg/dL and less than 120 mg/dL respectively. All data was collected via chart review.

Results

LGA is defined as birth weight above 90th percentile for gestational age, and macrosomia is defined as birth weight above 4,000 g. There was no trend found for increased odds of LGA or macrosomia across the increasing quartiles of A1C at diagnosis of GDM. The data did indicate that those in the highest A1C quartile at GDM diagnosis, when compared with the lowest quartile, did have nearly four-fold increased odds of LGA and threefold increased odds of macrosomia, but the associations did not reach statistical significance.

Conclusions

A1C is a marker of long-term glycemic control. However, the A1C elevation at GDM diagnosis is not linearly related to risk for LGA infants or macrosomia. This demonstrates the positive outcomes achieved with GDM treatment and strict glycemic control.

Comment

There are some concerns in this study. When women of "Asian, Indian or other race/ethnicity" were excluded, there was a more pronounced trend for increasing LGA and macrosomia with increasing A1C quartile at diagnosis. Women of this ethnicity tend to have smaller babies. Those treated with insulin and oral hypoglycemic

drugs in the study had a mildly stronger association between A1C (more than 5.7%) and LGA and macrosomia that approached being statistically significant. Lastly, those who had increasing trends of A1C during pregnancy did have a higher prevalence of LGA and macrosomia.

Nonetheless, the data obtained in this study illustrates the importance of glycemic control in pregnancy. It is reassuring for physicians and patients to know that glycemic control can be achieved regardless of severity of GDM at diagnosis. A patient who presents with severely elevated A1C at GDM diagnosis can still have a healthy baby with effective management. Future studies are warranted in the subgroups in the study that had different outcomes.

Diabetes in pregnancy may differentially affect neonatal outcomes for twins and singletons

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Diabet Med 2011; **28**: 1068–73

Objective

The purpose of this study was to determine if diabetes results in different neonatal outcomes in singleton versus twin pregnancies. There is little data on this subject. It seems intuitive that diabetes could actually benefit a twin pregnancy since there is higher nutrient demand with multiple fetuses.

Methods

This was a retrospective cohort study of 422,068 twin and 14,298,367 singleton pregnancies in the United States from 1998 to 2001. Datasets were obtained via the U.S. National Center for Health Statistics (NCHS). No information was obtained on the clinical subtype of diabetes. Outcomes measured included macrosomia, congenital anomalies, Apgar score, and neonatal death. Logistic regression was used to obtain the odds ratios for assessing the effects of diabetes in pregnancy.

Results

Diabetes complicated 3.5% of the twin pregnancies and 2.7% of the singletons. Diabetes in pregnancy resulted in similar risk for congenital anomalies in twins and singletons. Although twin pregnancies are still at increased risk of preterm birth and macrosomia, the risk is smaller compared to singletons. Lastly, twin pregnancies have a decreased risk of low 5-min Apgar score and neonatal death that is not present in singletons.

Conclusions

Twin and singleton pregnancies may be affected differently by diabetes. More studies are needed to determine if there are any differences depending on the type of diabetes that is present during pregnancy. Also, there may need to be changes

in the way diabetes is treated in pregnancy depending on whether it is a singleton or twin gestation that is present.

Comment

Pregnancy causes variation in hormones and insulin resistance. It seems obvious that the addition of a second fetus would alter these variations even further. It makes sense that diabetic pregnancies with twin gestation would have different outcomes compared to singletons. It will be exciting to see what future studies reveal in twin pregnancies complicated by diabetes.

Comment

Just as hyperglycemia has an effect on other organs in the body, such as the bladder, colon, and stomach, it seems very plausible that it could cause disease in the uterus. This study investigates a novel idea to explain CS in diabetics in that it attempts to discover why many diabetic pregnancies are complicated by prolonged labor and failed induction of labor. More studies will be needed investigating the role of other hormones that are altered in diabetes that may be playing a role. The changes that occur at the cellular level will also need investigation.

Diabetes is associated with impairment of uterine contractility and high caesarean section rate

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Diabetologia 2012; 55: 489–98

Objective

There is data to suggest that 56% of cesarean sections (CS) in diabetics were emergent, not elective. CS in diabetes is a risk factor for wound infection, thrombosis, and postpartum hemorrhage. The first things that likely come to mind when speaking about a diabetic mother needing CS is macrosomia or fetal distress. There is evidence that reductions in macrosomia do not result in reduction in CS rate. Failed induction of labor and prolonged labor often account for CS in diabetic pregnancies. The hypothesis of this study was that poor myometrial contractility due to diabetes contributes to the high frequency of CS.

Methods

Oxytocin-induced uterine contractions of diabetics and matched controls having elective CS were compared. Intracellular calcium, western blotting for calcium channels, and histology were also analyzed. Biopsies of the uterus were taken during elective CS from 40 patients with diabetes and 68 without for analysis.

Results

Diabetics had decreased uterine contraction amplitude and duration. When oxytocin was added to diabetic myometrium, there was an increase in contractility, but it was significantly reduced when compared to nondiabetics. Diabetics also had uteri with reduced muscle content, calcium entry channels, and intracellular calcium signaling.

Conclusions

One of the reasons many diabetic mothers have increased non-elective CS may be due to impaired myometrium with decreased response to oxytocin.

Gestational diabetes: a strong independent risk factor for severe neonatal respiratory failure after 34 weeks

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Arch Gynecol Obstet 2011; 284: 1099–104

Objective

Diabetes in pregnancy has been known to increase risk of respiratory problems in neonates. The specific impact of gestational diabetes mellitus (GDM) on respiratory morbidity has not been investigated until now. The purpose of the study was to evaluate if GDM is a risk factor for severe neonatal respiratory failure (NRF) in infants delivered after 34 weeks.

Methods

This was a retrospective cohort study in which 3,237 women with GDM who delivered after 34 weeks were analyzed. NRF diagnosis required 24-hour ventilation, admission to the neonatal intensive care unit, and radiological criteria. Study groups were compared using chi square test, Fisher exact test, and Mann Whitney test. Logistic regression analysis was done to identify variables which could have an effect on study outcomes.

Results

166 of the test patients were diagnosed with GDM and 7 of these cases met NRF criteria. This meant 4.21% of GDM patients had neonates with NRF. By comparison, only 13 of the rest of the patients had children with NRF. Pregnancies without diabetes resulted in severe NRF after 34 weeks only 0.42% of the time. There was no significant difference in the outcome between neonates with NRF from diabetic compared to nondiabetic mothers.

Conclusions

GDM was identified as an independent risk factor (odds ratio 10.93) for severe NRF after 34 weeks after adjusting for variables such as cesarean section, fetal gender, and hypotrophy. The risk was not significant for women for

pregestational diabetes (PGD). Other independent risk factors identified in the study were premature delivery and fetal hypotrophy.

Comment

It is surprising that PGD was not found to be statistically significant as a risk factor for NRF. The proposed mechanism is that hyperinsulinemia in the infant inhibits surfactant secretion in the newborn lung. This mechanism should be present in PGD. This lack of significance could be explained by the small sample size in this study, or it could be indicative of superior diabetes control in those with PGD. A future study that focuses on severe NRF incidence depending on level of glucose control and mode of treatment in diabetic mothers would be beneficial.

An important aspect in the treatment of any disease is being aware of risk factors. Based on the results in this study, awareness and anticipation of NRF in newborns of mothers with GDM should be promoted. However, larger prospective studies are needed to further define which infants may be at higher risk and how to best treat them.

Missed opportunities for type 2 diabetes testing following gestational diabetes: a population-based cohort study

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BJOG 2011; **118**: 1484–90

Objective

The thought is that few women with gestational diabetes mellitus (GDM) are appropriately tested for type 2 diabetes in the postpartum period. The purpose of this study was to evaluate postpartum care and trends in testing of GDM patients compared to those without GDM.

Methods

This was a retrospective population cohort study for women who delivered between 1994 and 2008 in Ontario, Canada. Through healthcare databases, 47,691 with GDM were identified and analyzed. Outcomes measured were oral glucose tolerance testing (OGTT) within six months of delivery and physician follow-up.

Results

Most women with GDM did not have a follow-up OGTT, although there was an increased trend to do so over the study period. There was an increase of approximately 0.8% per year in OGTT of GDM mothers over the study period. At the end of the study period, less than 1 in 6 women received postpartum OGTT. When including hemoglobin A1C and fasting glucose, more women do have some type of postpartum test. Nearly

all women followed up with a family physician or obstetrician, and these specialties rarely order the OGTT. Much less often does the patient follow up with an internist or endocrinologist.

Conclusions

Despite good follow-up with physicians postpartum, few women with GDM have the appropriate follow-up test to screen for diabetes. This is a missed opportunity to identify and treat a group susceptible to developing type 2 diabetes. There was an increased trend over the 14 years of the study to administer the OGTT.

Comment

GDM is a significant risk factor for type 2 diabetes and the highest risk period is immediately postpartum. Often times, type 2 diabetes is misdiagnosed as GDM. The reasons for lack of testing are not entirely clear. It is likely a combination of lack of appropriate follow-up testing by physicians and lack of patient interest wanting to be evaluated for diabetes. It is fair to say that most postpartum women do show up for some kind of medical care as the majority of them see an obstetrician or family physician. As of right now, the most sensitive test for diagnosing diabetes is the OGTT. Although there are other simpler tests, fasting glucose is not as sensitive a screening tool as OGTT, and hemoglobin A1C still needs to be evaluated in studies.

This lack of appropriate follow-up is more widespread than Canada. The results of this study and the questions it poses can serve to make us all question if there are better ways to ensure diabetes patients receive appropriate follow-up care. Lastly, in an era where medical care is shifting to a more standardized and preventative approach, a government-funded system such as that present in Canada can serve as an example of how both physicians and patients follow through with standard of care recommendations.

50-gram glucose challenge test: is it indicative of outcomes in women without gestational diabetes mellitus?

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J Matern Fetal Neonatal Med 2011; **24**: 1102–6

Objective

The purpose of this study was to determine if a positive 50-gram glucose challenge test (GCT) in women without gestational diabetes mellitus (GDM) has any effect on perinatal outcomes.

Methods

In a retrospective cohort study, 13,789 women without a diagnosis of GDM received a GCT at the University of

California, San Francisco. The GCT cutoff used for the need for the oral glucose tolerance test was 140 mg/dl. GCT results in 1,452 women had a positive GCT but negative oral glucose tolerance test (OGTT). They were compared to the 12,337 with a negative initial GCT. Both groups were analyzed for any relation to perinatal morbidity using chi-square test and multivariable logistic regression analysis.

Results

An elevated GCT without a diagnosis of GDM still increased the odds of negative outcomes like preeclampsia, cesarean delivery, and elevated birth weight. Greater degree of GCT abnormality was associated with increased odds of adverse outcomes.

Conclusions

There are increased odds of negative perinatal outcomes if a woman has an elevated GCT, even when she does not meet criteria for GDM. This lends credence to impaired glucose tolerance being a continuum in which negative outcomes can still occur even at mild severity of disease.

Comment

Like any screening test, there will be some false positives and false negatives based on the set cutoffs. It is important that the physician does not ignore a positive screening test in GDM. At the very least, the physician should take the time to explain lifestyle modifications. There may be an indication for monitoring glucose or repeating the GCT. The best way to diagnose GDM is still a work in progress.

Sex hormone-binding globulin levels and obesity in women with gestational diabetes: relationship with infant birth weight

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Gynecol Endocrinol 2011; 27: 905–9

Objective

There have been studies that have shown a low sex hormone-binding globulin (SHBG) in the first trimester is a predictor of gestational diabetes mellitus (GDM). The goal of this study was to determine if SHBG is associated with GDM independently of pre-pregnancy body mass index (BMI). A second hypothesis was that low SHBG was associated with higher birth weight in newborns.

Methods

Twenty women with GDM and 27 controls were evaluated. GDM screening and SHBG measurement were performed at

26.1±3.7 weeks of pregnancy. Student's t tests were used to compare GDM patients and controls. Multivariate regression model to predict birth weight was employed.

Results

There was no statistically significant trend for lower SHBG levels observed in GDM patients versus controls (179±36 versus 195±36, $p \leq 0.08$). SHBG level explained 10.7% of variance in infant birth weight.

Conclusions

SHBG is not an independent predictor of GDM when obesity is considered. SHBG did correlate significantly with prepregnancy BMI as well as BMI at screening for GDM. SHBG was found to be a predictor of infant birth weight independent of GDM and prepregnancy BMI.

Comment

This study revisits SHBG, a test that has been studied rather extensively in an effort to develop ways of screening for GDM. Seeking improved ways of detecting GDM early on is an important component of treatment. Earlier detection leads to better treatment. The small sample size in this study is a concern for the lack of statistical significance of SHBG as a screening tool. More studies are likely to follow on the relevance of SHBG in GDM.

Prediction of large-for-gestational-age birth weights in diabetic mothers based on early third-trimester sonography

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J Ultrasound Med 2011; 30: 1625–8

Objective

Diabetes in pregnancy is a risk factor for fetal overgrowth and large-for-gestational-age (LGA) birth weight. There is increased morbidity in both the mother and the infant as a result of LGA birth weight. Ultrasound has emerged as a reliable test to screen for macrosomia. Ultrasound can therefore be useful in modifying treatment during pregnancy and allowing preparation time for the delivery of the infant. However, it has mostly been studied for use in late pregnancy. The purpose of this study was to determine if early third trimester ultrasound screening would be useful in predicting LGA infants.

Methods

Eighty-six women with either pregestational or gestational diabetes underwent sonographic examination between 28 and 33 weeks gestation. They were divided into two groups. One being an estimated fetal weight above the 75th percentile (exposed group) and the other below 75th percentile (unexposed group). The primary outcome was having a baby with a birth weight above the 90th percentile.

Results

Pregestational and gestational diabetes patients had similar percentages of exposed and unexposed groups. Neonates in the exposed group were significantly more likely to be LGA than the unexposed group (65% versus 15%, $p < 0.001$). The sensitivity and specificity of being in the exposed group and weighing above 90th percentile was 79% and 74% respectively. There was no significance in rates of cesarean delivery between the exposed and unexposed groups.

Conclusions

Physicians should be aware that early third trimester ultrasound can be a useful tool in predicting LGA birth. It has been shown that effective glycemic control in the third trimester may have a significant impact on fetal growth. Perhaps women in the exposed group can be studied more closely in future trials to determine the optimal way to treat women with babies at risk for macrosomia.

Comment

This study demonstrates the continued usefulness of ultrasound in diabetes in pregnancy. The accuracy of ultrasound may have been even more accurate in predicting macrosomia because those in the exposed group were getting extra insulin due to risk for LGA. It is disappointing that cesarean delivery rates were no different. Ultrasound has the potential to become more sensitive and specific in younger gestational ages and this field will likely continue to advance. More studies with larger sample sizes are needed to allow for multivariable analysis.

Lactation intensity and postpartum maternal glucose tolerance and insulin resistance in women with recent GDM: the SWIFT cohort

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Objective

This study aims to determine the effect of lactation intensity on maternal blood glucose and insulin sensitivity in the postpartum period for gestational diabetes mellitus (GDM) mothers. Past studies have not focused on intensity of lactation, and they have been limited to women of Latino ethnicity.

Methods

This was a prospective observational cohort study of 522 women who enrolled into the Study of Women, Infant Feeding, and Type 2 Diabetes (SWIFT) trial, an ongoing trial of women diagnosed with GDM who delivered a singleton infant. Participants were divided into four groups: 1) exclusive breastfeeding, 2) mostly breastfeeding, 3) exclusive formula

feeding, or 4) mostly formula feeding and feedings continued from birth to 4–6 weeks postpartum. Women in the study chose their own feeding method. At 6–9 weeks postpartum, women were classified as normal, prediabetes, or diabetes according to a 2-hour 75-gram oral glucose tolerance test (OGTT). Blood glucose and insulin levels were also measured. Differences in data by feeding group were compared using chi square testing.

Results

The groups with exclusive breastfeeding and mostly breastfeeding had lower fasting glucose, fasting insulin, and lower prevalence of diabetes when compared to exclusive or mostly formula feeding groups. Exclusive breastfeeding mothers had lower body mass indexes (BMI) at time of OGTT and were more likely to be educated. They were also more likely to breastfeed during the OGTT. Classification of diabetes ($n = 17$), prediabetes ($n = 171$), or normal ($n = 334$) was inversely related with lactation intensity.

Conclusions

Lactation, through favorable effects on glucose and insulin, may reduce the risk of developing diabetes in the postpartum period in GDM mothers in a dose-dependent relationship.

Comment

This is another benefit of breastfeeding the newborn infant. The mechanism of improved metabolic profile is still not entirely clear. There are studies that indicate glucose uptake is increased in breastfeeding for lactogenesis via non-insulin-mediated uptake by the mammary glands. Other studies indicate that lactation causes increased insulin sensitivity and improves pancreatic beta-cell functioning.

This is a study organized by Kaiser Permanente in Northern California of women diagnosed with GDM. Strengths of the study are that it includes a wide range of different ethnic groups, whereas past studies have been limited to Latino women. Weaknesses are that the sample population is limited to one small geographic area and results may be subject to bias within that institution. The study may not have adequately taken obesity into account as a factor for inability to lactate.

Breastfeeding should be recommended in postpartum females at risk for developing diabetes. Many females never do receive appropriate follow-up screening for diabetes. Breastfeeding can be a measure to avoid diabetes in those without follow-up.

Spontaneous labor curves in women with pregnancies complicated by diabetes

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Objective

The purpose of the study is to determine if the first stage of labor is prolonged in women with diabetes.

Methods

This was a retrospective analysis of 226,668 deliveries from 2002–2008 from the Consortium of Safe Labor (National Institute of Child Health and Human Development, National Institutes of Health). Those with spontaneous onset of labor during gestational weeks 37 through 41 ($n=71,282$) were categorized as preexisting diabetes (PGD), gestational diabetes (GDM), or normal controls. Labor curves were then created, taking into account body mass index (BMI) and neonatal birth weight. Chi square testing was the method for data analysis.

Results

Among nulliparous women, 118 had PGD, 475 had GDM, and 25,771 were control subjects. For multiparous women, 311 had PGD, 1,079 had GDM, and 43,528 served as controls. Dilatation rates were observed to be different in nulliparous and multiparous but labor progression was similar in all subgroups when matched for BMI and birth weight. The only statistically significant difference in labor progression was observed in the second stage of labor in multiparous women with PGD. Oxytocin augmentation of spontaneous labor did not differ between the groups.

Conclusions

This study found no difference in the labor curves of women with PGD, GDM, and normal controls regardless of parity, birth weight, or BMI.

Author Disclosure Statement

The authors declare that no competing financial interests exist.

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Comment

Cesarean rates have increased by almost 60% from 1996 to an all-time high of 32.9% in 2009. The reasons are not entirely clear. It may be due to increasing physician concern for problems like shoulder dystocia, or it may be due to increasing tendency to induce labor. As described earlier in this chapter, diabetics and obese women may have altered myometrium. More research needs to be conducted to determine which women are at risk for endometrial dysfunction and how to best treat it. This study suggests that diabetic women who are able to progress to spontaneous labor without the need for induction are likely to have similar progression of labor to normal individuals.