



A study of Predictors of cesarean delivery in pregnant women with gestational diabetes mellitus

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ABSTRACT

Purpose The aim of this study was to evaluate which risk factors may lead patients with gestational diabetes mellitus to cesarean delivery.

Methods This was a retrospective, descriptive study. The subjects of the study were pregnant women with gestational diabetes mellitus attending a public maternity hospital in the central India. The primary outcomes assessed were based on maternal and fetal characteristics. The data were correlated using an odds ratio (OR) with a 95% confidence interval (95%CI), calculated using multinomial logistic regression.

Results A total of 392 patients with gestational diabetes mellitus were analyzed, and 57.4% of them had cesarean deliveries. Among the maternal characteristics, the mean age of the patients and the pregestational body mass index were greater when a cesarean delivery was performed ($p = 0.029$ and $p < 0.01$ respectively). Gestational age at birth, newborn weight, weight class according to gestational age, and Apgar score were not significant. The analysis of the OR showed that the chance of cesarean delivery was 2.25 times (95%CI = 1.49–2.39) greater if the pregnant woman was obese, 4.6 times (95%CI = 3.017–7.150) greater if she was a primigravida, and 5.2 times (95%CI = 2.702–10.003) greater if she had a previous cesarean delivery. The other parameters analyzed showed no differences.

Conclusion The factors that led to an increase in the occurrence of cesarean deliveries included history of a prior cesarean section, first pregnancy, and obesity.

KEYWORDS : Gestational diabetes, Cesarean section

Background

Gestational diabetes mellitus (GDM) is one of the most frequent metabolic disorders during pregnancy, with incidence rates ranging from 1.1 to 14.3% depending on the adopted diagnostic criteria and the study population.[1] In Brazil, GDM affects 7% of all pregnancies.[2] This pathology is associated with several undesirable pregnancy outcomes, including an increased risk of premature rupture of the membranes, preterm birth, fetal macrosomia, and preeclampsia.[2]

In addition to the factors mentioned above, several others are associated with a higher incidence of cesarean deliveries, including: age above 30 years; occurrence of prior cesarean deliveries; first gestation; cervical dilation of 3 cm or less at the time of delivery; gestational age below 37 weeks or above 40 weeks; non-cephalic presentation; prior maternal pathology; previous use of oxytocin in the pre-partum; secondary or tertiary maternal education level; number of prenatal consultations greater or equal to 7; labor during daytime; and maternal overweightness or obesity.[4] [5] [6]

Even though the cesarean section has no absolute contra indications, this procedure, like any other surgical procedure, is not risk-free. In some occasions, however, the benefits associated with reducing the maternal-fetal morbidity and mortality outweigh the risks associated with performing a cesarean section.[3] [7] Some studies suggest that unplanned (emergency) cesarean sections result in increased maternal morbidity compared with planned cesareans.[8] Thus, it is important to identify which risk factors may lead to a requirement for cesarean delivery, so that the procedure can be planned in advance, if necessary, to avoid possible complications for both the mother and the fetus.

The objective of this study was to identify the risk factors related to birth by cesarean section in pregnant women with GDM.

Methods

This was a retrospective and descriptive study including pregnant women with GDM attending a public maternity hospital in central India

The study included pregnant women with GDM according to the diagnostic criteria of the International Association of Diabetes and Pregnancy Study Groups (IADPSG), aged 18 years or over, with a single gestation and without associated conditions. The

participants who presented incomplete data in their medical records were excluded.

The primary outcomes evaluated were maternal age, maternal BMI, nulliparity, occurrence of a prior cesarean section, type of treatment used, glycemic levels, and FAC.

Results

A total of 392 patients with GDM were analyzed, and none were excluded. Among the maternal characteristics, the mean age of the patients and the pregestational BMI were higher at the time the cesarean section was performed ($p < 0.029$ and $p < 0.01$ respectively).

Table 1 showing Maternal and fetal characteristics related to gestational diabetes mellitus.

	CS (n = 225)		ND (n = 167)		
Age	31.16	(±6.35)	29.66	(±6.314)	0.029*
Number of pregnancies	2.64	(±1.558)	2.72	(±1.878)	0.859*
Pregestational BMI	31.226	(±6.0991)	28.782	(±5.7869)	< 0.01**
GA upon arrival	29.82	(±6.037)	30.32	(±5.627)	0.388*
FAC	60.53	(±25.071)	58.96	(±24.009)	0.485*
MFBG	91.2	(±13.175)	89.31	(±12.18)	0.115*
MPPBG	117.2	(±17.992)	117.79	(±12.18)	0.594*
Treatment					
Diet	68	(30.22%)	55	(32.93%)	0.567***
MTF	95	(42.22%)	77	(46.10%)	0.443***
Insulin	41	(18.22%)	22	(13.17%)	0.178***
MTF+ insulin	21	(9.33%)	13	(7.78%)	0.590***

The gestational age at delivery, the weight of the newborn, the class of weight of the newborn according to the gestational age, and the Apgar score at the first and fifth minutes also did not differ significantly between the groups. The admission to the intensive care unit was the characteristic that came closest to having statistical significance ($p = 0.052$).

Table 2: Newborns' characteristics related to gestational diabetes mellitus.

	CS		ND		p
	(n = 225)		(n = 167)		
Prematurity	21 (%)		14 (%)		0.774*
GA at delivery	38.60 (±1.50)		38.52 (±1.26)		0.522**
NB weight	3.343.13	(±522.785)	3.280.84	(±460.59)	0.221***
Value by weight class					
SGA	20	(8.88%)	15	(8.98%)	0.974*
AGA	161	(71.55%)	128	(76.64%)	0.257*
LGA	44	(19.55%)	24	(14.37%)	0.180*
Apgar score					
1st min	8.01	(±0.961)	8.04	(±1.219)	0.092**
< 7 on the 1st min	10	(4.44%)	13	(7.78%)	0.164*
5th min	8.94	(±0.536)	8.94	(±0.766)	0.577**
< 7 on the 5th min	2	(0.88%)	2	(1.19%)	1.000****
ICU	17	(7.55%)	5	(2.99%)	0.052***

Regarding the BMI, when this parameter was categorized as adequate or indicating overweightness, the chance of cesarean delivery decreased by 0.7 and 0.4 times respectively, whereas obesity increased the chance of this procedure by 2.2 times.

Treatment with diet or the use of oral hypoglycemic agents and/or insulin, and the FAC did not influence the outcome.

Table 3: Factors associated with cesarean sections.

	OR	95%CI	p
Maternal characteristics			
Age ≥35	1.706	0.994–2.927	0.361
Primigravida	4.645	3.017–7.150	0.000
Prior cesarean section	5.198	2.702–10.003	0.000
BMI low weight	0.213	0.190–2.345	0.188
BMI adequate weight	0.337	0.176–0.647	0.024
BMI overweight	0.563	0.326–0.970	0.049
BMI obese	2.252	1.493–3.396	0.000
Treatment			
Diet	0.767	0.274–2.147	0.567
MTF	0.668	0.257–1.734	0.443
Insulin	1.452	0.510–4.137	0.179
MTF + Insulin	1.219	0.592–2.512	0.590
Altered MFBG (> 90)	1.082	0.653–1.795	0.310
Altered MPPBG (> 120)	0.753	0.448–1.263	0.536

Discussion

Due to increased maternal and fetal complications arising from GDM, it becomes evident that abdominal delivery is a priority choice for many obstetricians, as observed in our study (57.4%). However, GDM alone is not an indication for cesarean section or for the interruption of the gestation before 38 weeks. In a study published by Moore et al[9] comparing cesarean rates in control versus GDM women, the results between both were similar, with rates of 35% and 69.44% respectively. The same data was corroborated in the study published by Zanrosso et al,[10] in which cesarean section was the delivery route adopted in 60.5% of the women with GDM.

We observe in our study a significant relationship between a prior cesarean section and the choice for surgical delivery in women with GDM (OR = 5.198, 95%CI = 2.702–10.003). Even today, the occurrence of a first cesarean section still determines a new

cesarean section in the following pregnancy. Although some evidence shows benefits of vaginal delivery after cesarean section for most women with a previous cesarean section performed with a low transverse uterine incision, the fear of rupture of the uterine scar associated with the risk of fetal macrosomia leads to a surgical interruption of delivery in diabetic pregnant women.[16]

Gonçalves et al[17] showed a direct relationship between BMI and cesarean rates, especially in a group with BMI ≥ 30 kg/m2 (p = 0.004). These data corroborate those found in our study, in which the rates of cesarean delivery were significantly higher in women with GDM, especially when we analyzed those with a BMI of obesity (OR = 2.252, 95%CI = 1.493–3.396). Thus, it becomes evident that excessive gestational weight is a determining factor for the definition of the delivery route.

A study published by Landon et al[18] compared the perinatal outcomes in pregnant women with mild GDM. The results showed a significant reduction in cesarean rates among women with mild GDM treated pharmacologically compared with a control group (13.0% versus 19.7%, p = 0.01). It is known that GDM treatment reduces the frequency of fetuses large for gestational age, which may have contributed to the lower rate of cesarean sections.[18]

In our study, the type of treatment was not decisive for the choice of delivery route. Perhaps this difference in results may be linked to methodological issues, since our study lacked a control group for comparisons with other groups managed with pharmacotherapy or diet alone, considering that all pregnant women were treated.

The measurement of the FAC is a strong indicator of fetal overgrowth and hyperinsulinism,[20] with values ≥ 75% for gestational age measured between 29 and 33 weeks being closely related to fetal macrosomia.[21]

Due to the retrospective methodological design and the variability of professionals and individualized procedures in the referral center in which the data for this study were collected, we believe that controlled prospective studies may contribute to the credibility of the outcomes found in the present study.

Conclusion

Our study found a higher incidence of cesarean section than normal delivery in pregnant women with GDM.

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