Saúde e Pesquisa
DOI: 10.17765/2176-9206.2023v16n1.e11176

Adverse maternal-fetal outcomes related to parity in a maternity hospital in Southern Brazil

Desfechos materno-fetais adversos relacionados a paridade em uma maternidade do sul do Brasil

Pedro Bonilauri Ferreira[1], Laura Luiz[1*], Rodrigo Ribeiro e Silva[1], Jean Carl Silva[2]

[1] Undergraduate student of the Medicine course at the University of Joinville Region (UNIVILLE), Joinville (SC), Brazil. [2] PhD in Medical Sciences (UNIFESP/SP); Supervisor of the High Risk sector of Maternidade Darcy Vargas; Professor of the graduation in Medicine and of the Graduate Program in Health and Environment at the University of Joinville Region (UNIVILLE), Joinville (SC), Brazil.

***Corresponding author:** Laura Luiz –*E-mail*: lauraluizc@gmail.com

ABSTRACT
To investigate the effects of perinatal primiparity. This was a cross-sectional cohort study, carried out at the Darcy Vargas Maternity Hospital in Joinville, state of Santa Catarina, from August to December 2020. Patients were assigned to 2 groups, primiparous and multiparous. With the analysis of electronic medical records, perinatal adverse outcomes were evaluated using the adjusted odds ratio, using a 95% confidence interval. Confounding factors adopted were: age, smoking, alcoholism, and other drugs. Postpartum women were divided into primiparous (n=522/31.2%) and multiparous (n=1,148/68.7%) women. After calculating the adjusted odds ratio, primiparous women had an increased chance of having an episiotomy (OR= 7,069 CI95% 4,275-11,690), prematurity (OR=1,784 CI95% 1,011-3,148) and reduced chance of Large for Gestational Age (LAG) newborns (OR=0,555 CI95% 0,388-0,793). Primiparous patients had a higher chance of having an episiotomy, prematurity, and a lower chance of LAG newborns.

Keywords: Episiotomy. Parity. Premature.

RESUMO
Avaliar os desfechos adversos perinatais relacionados à primiparidade. Trata-se de um estudo de corte transversal, realizado na Maternidade Darcy Vargas em Joinville–SC, no período de agosto a dezembro de 2020. Dividiu-se as pacientes em 2 grupos, primíparas e multíparas. Através da análise do Prontuário Único do Paciente (PUP), os desfechos perinatais adversos foram avaliados com cálculo de razão de chance ajustado, utilizando intervalo de confiança de 95%. Os fatores de confusão adotados foram: idade, tabagismo, alcoolismo e outras drogas. As puérperas foram divididas em primíparas (n=522/31,2%) e multíparas (n=1148/68,7%). Após o cálculo de razão de chance ajustado, primíparas tiveram aumento da chance de episiotomia (RC=7,069 IC95% 4,275-11,690), prematuridade (RC=1,784 IC95% 1,011-3,148) e redução da chance de recém-nascidos Grandes para a Idade Gestacional (GIG) (RC=0,555 IC95% 0,388-0,793), não interferiu nos demais desfechos. Pacientes primíparas apresentaram maior chance de episiotomia, prematuridade e menor chance de recém-nascidos GIG.

Palavras-chave: Episiotomia. Paridade. Prematuridade.

Received in Decembrer 19, 2022
Accepted on Fevereiro 16, 2023

INTRODUCTION

In modern society, from the moment a woman discovers she is pregnant, she must attend the recommended prenatal visits until delivery, where tests and restrictions on pre-gestational habits will be demanded. During the gestational period, physiological changes occur in the female body, whether physical or biological changes, to provide the fetus with the necessary means for its development, as well as in the psychic aspect, through hormonal changes that can destabilize the emotional state. [1]

However, procedures aimed at qualifying fetal development may overlap with medical interest in maternal emotional health, which yearns for answers to her doubts and prominent fears, such as labor. This context of gestational distress stands out among primiparous women who experience all these changes for the first time and deal with transgenerationality through the influence of third-party opinions, which report their obstetric history. [2]

Thus, the first pregnancy can contribute to different gestational outcomes, because in addition to the physiological issue of the woman, who was nulliparous, one must consider the emotional aspect of this puerperal woman, which suffers from hormonal influences and on account of other individuals. [3] In this context, primiparous women may be more likely to develop Pregnancy-Specific Hypertensive Disease (PSHD) and require episiotomy, in addition to being more likely to have premature births. [4,5]

Thus, studies on the correlation between nulliparity and unfavorable gestational outcomes are required, to observe whether the first pregnancy represents a risk factor for maternal and child health. Therefore, if the correlation is proven, prenatal care can be adapted to the adverse factors that prove to be predisposing in nulliparous pregnant women.

In this context, given the impactful relationship between prematurity and adverse gestational and perinatal events, research on this restriction in the obstetric period is necessary. Thus, the present study aimed to investigate perinatal outcomes associated with prematurity.

METHODOLOGY

This was a cross-sectional study on the impact of primiparity on maternal-fetal outcomes, which divided postpartum women into two groups, namely primiparous and multiparous.

Data collection began after authorization by the Research Ethics Committee. The project was approved under number CAAE 28786020.5.0000.5363 and opinion number 4.178.654, by the Research Ethics Committee of the Regional Hospital Hans Dieter Schmidt, Joinville, state of Santa Catarina, Brazil. The study followed the criteria defined by Resolution 466/2012, each puerperal woman signed an Informed Consent in person.

Inclusion criteria were: puerperal women aged 18 years or older undergoing prenatal care at Health Units of the Unified Health System (SUS) in the municipality of Joinville, state of Santa Catarina, whose delivery took place at the Darcy Vargas Maternity, and who voluntarily chose to participate in this research, by signing the Informed Consent. The exclusion criterion for participants was: postpartum women who refused to participate after starting the questionnaire.

An interview including socioeconomic aspects, life habits, family, obstetric background, and information about the current pregnancy, was administered. The interview was applied to a stratified random sample of postpartum women whose deliveries took place at the Darcy Vargas Maternity and with all prenatal care provided by the Unified Health System in the municipality

of Joinville, state of Santa Catarina. Even so, through analysis of the Single Patient Record, newborns were evaluated for Capurro, birth weight, appropriate weight for gestational age, Apgar score at 1 and 5 minutes, mode of delivery, need for neonatal ICU, in addition to adverse outcomes, such as prematurity and low birth weight and the development of PSHD.

Data were collected out from August to December 2020. All data were obtained by an interview with a qualified listener and from the Electronic Medical Record at the Darcy Vargas Maternity, 48 hours after delivery.

Maternal data such as age, Body Mass Index (BMI), weight gain, race, education, salary, and marital status were analyzed. In addition, data regarding obstetric and family history, lifestyle habits (smoking, alcoholism, and other drugs), and the presence of previous pathologies (e.g. Diabetes Mellitus and Systemic Arterial Hypertension) or those developed during pregnancy (PSHD, Gestational Diabetes Mellitus), as well as the number of prenatal visits and follow-up in the High-Risk Sector at the Darcy Vargas Maternity.

As determined by the World Health Organization (WHO), postpartum women who had fasting blood glucose ≥92 mg/dL and ≤ 125 mg/dL were classified as diabetic. Gestational Diabetes Mellitus (GDM) was also diagnosed when at least one of the values of the Oral Glucose Tolerance Test (OGTT) with 75 g was ≥ 92 mg/dL in the fasting period, ≥ 180 mg/dL in the first hour, and between ≥ 153 mg/dL and ≤199 mg/dL in the second hour.

The primary neonatal outcomes analyzed were: cesarean section, laceration, episiotomy, development of GDM, PSHD, prematurity, low birth weight, Small for Gestational Age (SGA) newborns, Large for Gestational Age (LGA) newborns, Neonatal Intensive Care (ICU), and Apgar score at 1 and 5 minutes.

Concomitantly with the collection, data were digitized in an electronic platform with double entry, to check for agreement and possible typing errors. The statistical software Statistical Package for the Social Sciences (SPSS) 21.0, was used for statistical analysis. All variables were analyzed descriptively; thus, continuous variables (numerical) were studied by calculating means and standard deviations. For qualitative variables, absolute and relative frequencies were calculated. To test the hypothesis of no difference between the means of the groups, the Student's t-test was applied, provided that distribution was normal, and the non-parametric Mann-Whitney test, for non-normal data. The normality test adopted was the Kolmogorov-Smirnov. To prove the homogeneity of the groups in relation to proportions, the Chi-square test or Fisher's exact test was used for frequencies below 5.

Multinomial logistic regression models were constructed to analyze primiparity with adverse perinatal outcomes (cesarean section, laceration, episiotomy, development of GDM, PSHD, prematurity, low birth weight, SGA newborns, LGA newborns, and neonatal ICU). Thus, the relevance of the effect of variables was estimated by calculating the odds ratio (OR) adjusted according to confounding factors, with their respective 95% confidence intervals (95%CI). The confounding factors used were: age, smoking, alcoholism, and other drugs. Values were considered significant when $P<0.05$.

RESULTS

The scarcity of studies demonstrating the obstetric outcomes of primiparous women in the literature evidences the necessity to analyze the impact of primiparity on maternal-fetal health. Thus, the present study evaluated 1,670 postpartum women served at the public obstetrics

service at the Darcy Vargas Maternity in Joinville, state of Santa Catarina. Among these, 522 (31.2%) were primiparous, while 1,148 (68.7%) of the postpartum women were multiparous, there were no exclusions.

Among the significant characteristics in the present study, puerperal women differed in terms of age, with primiparous women having a lower mean age than multiparous women. In addition, there was a difference in the weight between these two groups of pregnant women, since the multiparous women had a higher pre-gestational BMI and were more obese. However, primiparous women had greater gestational weight gain.

The primiparous women obtained greater adequacy to the Ministry of Health and WHO mandatory consults compared to the other group. Multiparous women, in turn, had more cases of GDM and smoking during pregnancy. All the aforementioned data are listed in Table 1.

Table 1. Maternal characteristics related to parity

(Continua)

	Multiparous (n=1148)	Primiparous (n=522)	*P*
Age*	28.8 (6.1 SD)	24.1 (5.0 SD)	<0.001
Pre-Gestational BMI*	26.5 (5.7 SD)	25.4 (5.6 SD)	<0.001
Obesity**	289 (25.2%)	93 (17.8%)	0.001***
Weight gain*	12.3 (7.3 SD)	13.6 (6.9 SD)	<0.001
Excessive Weight Gain**	470 (40.9%)	241 (46.2%)	0.045***
Race**			0.738***
White**	925 (80.6%)	426 (81.9%)	
Black**	50 (4.4%)	19 (3.7%)	
Brown **	173 (15.1%)	75 (14.4%)	
Education**			<0.001***
Primary**	360 (31.4%)	61 (11.7%)	
Secondary**	665 (57.9%)	364 (69.7%)	
Higher Education**	123 (10.7%)	97 (18.6%)	
Previous pregnancies*	3.0 (1.3 SD)	1.0 (1.0 SD)	<0.001
Previous Vaginal deliveries*	1.7 (1.5 SD)	0.6 (0.4 SD)	<0.001
Previous cesarean deliveries*	0.9 (1.1 SD)	0.4 (0.4 SD)	<0.001
Miscarriages*	0.4 (0.7 SD)	0 (0.0 SD)	<0.001
Paid Activity**	482 (42.0%)	257 (49.2%)	0.006***
Marital Status**			0.018***
Married**	352 (30.7%)	148 (28.4%)	
Single**	658 (57.3%)	320 (61.3%)	
Stable union**	110 (9.6%)	52 (10.0%)	
Divorced**	28 (2.4%)	2 (0.4%)	
Number of Prenatal Consultations*	8.6 (3.6 SD)	8.8 (2.9 SD)	0.059
Compliance with MS**	958 (83.4%)	459 (87.9%)	0.018***

(Conclusão)

	Multiparous (n=1148)	Primiparous (n=522)	*P*
Compliance with WHO**	714 (62.2%)	375 (71.8%)	<0.001***
Prenatal High Risk **	385 (33.5%)	116 (22.2%)	<0.001***
GDM**	266 (23.2%)	79 (15.1%)	<0.001***
DHEG**	96 (8.4%)	55 (10.5%)	0.151***
Previous DM**	15 (1.3%)	5 (1.0%)	0.544***
Previous SAH**	84 (7.3%)	26 (5.0%)	0.074***
Smoking**	106 (9.2%)	19 (3.6%)	<0.001***
Alcoholism**	31 (2.7%)	7 (1.3%)	0.084***
Other Drugs**	8 (0.7%)	2 (0.4%)	0.349****

*Mean (Standard Deviation); **Absolute values (Percentages); *** Chi-square test; ****Fisher's Exact test; BMI – Body Mass Index; GDM –Gestational Diabetes Mellitus; DM – Diabetes Mellitus; PSHD – Pregnancy-Specific Hypertensive Disease; SAH – Systemic Arterial Hypertension. Values were considered significant when $P < 0.05$.

In relation to newborns, the unborn children of primiparous pregnant women had lower birth weight and were born with higher gestational age, and only a minority were classified as SGA or LGA, compared to those of multiparous women. Regarding childbirth complications, primiparous women had more cases of episiotomy compared to the other group of pregnant women, as seen in Table 2.

Table 2. Characteristics of newborns related to parity

(Continua)

	Multiparous (n=1148)	Primiparous (n=522)	*P*
Birth Weight*	3,332.0 (537.4 SD)	3,207.6 (549.5 SD)	<0.001
GA at delivery*	38.6 (1.8 SD)	38.8 (2.1 SD)	0.047
Weight adequacy			<0.001***
SGA**	80 (7.0%)	52 (10.0%)	
AGA**	872 (76.0%)	418 (80.1%)	
LGA**	196 (17.1%)	52 (10.0%)	
Macrosomic**	88 (7.7%)	31 (5.9%)	0.204***
delivery route			0.916***
Vaginal**	661 (57.6%)	302 (57.9%)	
C-section**	487 (42.4%)	220 (42.1%)	
Laceration**	370 (32.2%)	179 (34.3%)	0.406***
Episiotomy**	44 (3.8%)	74 (14.2%)	<0.001***
1-minute Apgar*	7.7 (0.9 SD)	7.6 (1.1 SD)	0.072

(Conclusão)

	Multiparous (n=1148)	Primiparous (n=522)	*P*
5-minute Apgar*	8.8 (0.5 SD)	8.8 (0.7 SD)	0.540
Prematurity**	76 (6.6%)	48 (9.2%)	0.063***
Low Birth Weight**	62 (5.4%)	38 (7.3%)	0.134***
Neonatal ICU**	91 (7.9%)	43 (8.2%)	0.828***

*Mean (Standard Deviation); **Absolute values (Percentages); *** Chi-square test; GA – Gestational Age; SGA – Small for Gestational Age; AGA – Appropriate for Gestational Age; LGA – Large for Gestational Age; ICU – Intensive Care Unit. Values were considered significant when $P < 0.05$.

Results of the adjusted odds ratio for primiparous and multiparous mothers indicated that primiparous women had a higher probability of having an episiotomy (OR = 7.069; 95% CI 4.275-11.690), prematurity (OR=1.784; 95% CI 1.011-3.148). Furthermore, primiparity proved to be a protective factor for LGA newborns (OR=0.555; 95% CI 0.388-0.793), not interfering with the other outcomes.

Table 3. Odds ratio of adverse outcomes related to parity*

	P	OR	95% CI
C-section	0.122**	1.252	0.942-1.664
Laceration	0.556**	1.093	0.813-1.471
Episiotomy	<0.001**	7.069	4.275-11.690
GDM	0.410**	0.878	0.645-1.196
PSHD	0.119**	1.382	0.920-2.075
Prematurity	0.046**	1.784	1.011-3.148
Low weight at birth	0.771**	0.903	0.453-1.797
SGA newborns	0.203**	1.367	0.844-2.214
LGA newborns	0.001**	0.555	0.388-0.793
NICU	0.493**	0.838	0.506-1.388

*Confounding factors: Age, Smoking, Alcoholism and Other Drugs. ** Chi-square test; OR – Odds Ratio; 95% CI - 95% Confidence Interval; GDM – Gestational Diabetes Mellitus; PSHD – Pregnancy-Specific Hypertensive Disease; SGA – Small for Gestational Age; LGA – Large for Gestational Age; NICU – Neonatal Intensive Care Unit. Values were considered significant when P <0.05.

DISCUSSION

The present study pointed out different perinatal outcomes related to primiparity in a significant number of puerperal women in the same maternity hospital. This study shows that primiparous puerperal women showed an increased chance of needing an episiotomy during childbirth and having premature births. In addition, the primiparous group had a significantly lower chance of having LGA newborns.

This study evaluated 1,670 postpartum women, of which 522 were primiparous, that is, 31.2% sample. Comparing this data with the literature, a study carried out in Sweden examined the relationship between BMI and GDM

in pregnant women, and 45.67% of the sample was composed of primiparous women. [6] Another study in an outpatient clinic in the state of Paraná reported the prevalence of GDM among pregnant women, and 19.40% patients were primiparous. [7] The difference in the percentage of primiparous pregnant women is due to several factors, such as economic and sociocultural issues.

As for maternal characteristics of primiparous pregnant women, in this study, most were single, gained more weight during pregnancy, and attended more prenatal care visits compared to multiparous women. A study evaluated the indication of cesarean section for primiparous pregnant women also found that patients were mostly single, but had an average of 5.9 prenatal visits, although the recommendation by the Ministry of Health is at least 6. [8] About weight gain, Lan-Pidhainy et al. also verified that primiparous pregnant women gained more weight during pregnancy compared to multiparous women. [9]

In agreement with our findings, a study at a university hospital in Porto Alegre (state of Rio Grande do Sul) concluded that primiparity does not represent a decisive factor for the increase in the incidence of cesarean sections, also stating that pregnant women with previous cesarean section were more likely to have this procedure performed again. [10] Another study investigated the indications for cesarean section in a hospital in Ecuador, and reported that primiparous women did not significantly have more cesarean deliveries than multiparous women, confirming the finding of the present study. [11]

Corroborating this study, an investigation at a maternity hospital in Curitiba (state of Paraná) found a significant relationship between primiparity and episiotomy, considering the procedure was performed in 9.39% primiparous women (our study found an incidence of 14.2%), whereas it was performed in only 1.87% multiparous women. [12] Another study conducted in Bragança, Portugal, demonstrated that primiparous patients had a 7.18 times greater chance of undergoing an episiotomy compared to multiparous pregnant women, similar to that obtained in the present study. [13] The main indication of episiotomy in primiparous women is the perineum rigidity presented by pregnant women during the first delivery.[14]

There are controversies regarding the influence of primiparity on the incidence of lacerations. The same study that registered an increase in the number of episiotomies among primiparous pregnant women also observed a significant increase in the incidence of lacerations among women in this group. [12] The difference between this investigation and the present study may have occurred due to the lower frequency of episiotomy procedures in pregnant women at the maternity hospital in Curitiba compared to the institution of the present study, considering that the episiotomy procedure is indicated to prevent severe lacerations.[15]

About the influence of primiparity on the development of GDM, a Finnish study found that the incidence of GDM is high among primiparous women, but that age and body fat level are determining factors for its development. [16] Most primiparous women in the present study were not obese or had advanced age, which may have contributed to the non-development of GDM in the studied population. The literature also agrees with our results on the lack of significant relationships between gestational hypertensive syndrome and primiparity. [17]

Also, the literature corroborates the fact that primiparous women experienced premature births more frequently. A study on live births in the state of Mato Grosso observed that one of the risk factors for prematurity is primiparity. [18] A study that compared primiparous and multiparous pregnant women over 40 years old

showed a higher incidence of premature births in the first group. [19] Prematurity is more frequent among primiparous women because premature rupture of ovular membranes frequently occurs in this group. [20] Although the study showed a significant increase in the number of premature births among primiparous women, the number of admissions to the neonatal ICU was non-significant.

The impacts of primiparity on the birth weight of newborns are discussed in the literature. A study carried out in Santos (state of São Paulo) obtained no significant results about the influence of mothers' parity on the low birth weight of their babies.[21] Nevertheless, another study conducted in a hospital in Santa Catarina detected a positive relationship between primiparity and low birth weight. [22] Such differences between the results may occur due to the difference in the number of prenatal visits performed between the samples, which is an extremely important factor for the occurrence or not of adverse fetal outcomes.

Concerning the birth of SGA newborns, the literature disagrees with our results, since some studies point to primiparity as the cause for the birth of children small for gestational age.[23,24] Such divergence is due to the limited sample of the research compared to the others. On the other hand, the present study found a reduced chance of primiparous pregnant women having LGA children.

Other studies show that multiparous women have a higher risk of delivering LGA children compared to primiparous women, with the increase in the number of LGA newborns observed only among obese primiparous women. [9, 25] The fact that primiparous women have fewer LGA babies can be explained by the lower incidence of obesity in this group, as maternal BMI is directly related to the appropriate weight of the newborn. [26]

For a better context, the institution where the present study took place assists approximately 6,000 births per month. Although this research was carried out with a sample of pregnant women from the same institution, the duration of the study could have been extended and more comprehensive, as in addition to increasing the sample number, it could also diversify the patients.

The present study highlights the importance of the necessary care by the obstetrician or prenatal doctor in the patient's first pregnancy, given the proven correlation between primiparity and episiotomy. In this context, the provision of means to promote perineal integrity during labor is extremely significant for maternal health.

A systematic review and meta-analysis on traumas and complications from vaginal deliveries points out that perineal massage during prenatal care can prevent the need to have an episiotomy. Therefore, with the present study is expected that the prenatal health team contributes to maternal care by suggesting means of preventing the need to have an episiotomy in primigravity, to reduce postpartum complications and trauma to the perineum in primiparous women. [27]

CONCLUSION

In conclusion, attention and care for primiparous patients should be intensified and taken into account when seeking prenatal care. These results should be analyzed with caution and may not be extrapolated to other populations, given the retrospective design of the study. For future research, prospective studies are suggested to analyze the impacts of parity on pregnancy outcomes, with a sample size calculated for this outcome.

Through the present study, it was concluded that primiparity increased by 7.06 times the chances of puerperal women needing

to have an episiotomy and by 1.78 times, having a premature child. Primiparity decreases by 0.55 times the chance of puerperal women delivering an LGA baby. The chances of primiparous pregnant women developing GDM, PSHD, having a cesarean section, and having a laceration were not significant. Nor were significant the chances of this group having a child with low birth weight, SGA, or needing a neonatal ICU.

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