Cogitare Enfermagem

ORIGINAL ARTICLE

DETERMINANTS OF THE PROLACTIN LEVEL IN IMMEDIATE POSTPARTUM WOMEN

Erica de Brito Pitilin[1], Vanessa Aparecida Gasparin[2], Margarete Dulce Bagatini[3], Maicon Henrique Lentsck[4]

ABSTRACT

Objective: to identify the determinants of the prolactin level in immediate postpartum women.

Method: a cross-sectional study conducted with 60 puerperal women seen at a reference hospital in western Santa Catarina. A questionnaire and the Idate-Trait Anxiety Scale were applied; prolactin was also collected by venipuncture. The data were analyzed by means of simple and multiple linear regressions.

Results: the mean prolactin level was 268.38 ng/mL. The breastfeeding time during the first hour after birth (p=0.000) and the type of delivery (p=0.017) were able to predict the outcome of the study, while the puerperium time in hours (p=0.088) and anxiety (p=0.170) did not remain statistically significant in the final model.

Conclusion: the results of this study are expected to contribute to stimulating and encouraging the adoption of conducts that favor the care provided to women.

DESCRIPTORS: Breastfeeding; Nursing; Prolactin; Women's Health; Postpartum Period.

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[1]Nurse. PhD in Health Sciences. Nursing teacher of the Federal University of the South Border. Chapecó, SC, Brazil.
[2]Nurse. Master in Nursing. Nursing teacher of the State University of Santa Catarina. Chapecó, SC, Brazil.
[3]Pharmacist. PhD in Biological Sciences. Nursing teacher of the Federal University of the South Border. Chapecó, SC, Brazil.
[4]Nurse. PhD in Nursing. Nursing teacher of the State University of Midwest Paraná. Guarapuava, PR, Brazil.

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DETERMINANTES DO NÍVEL DE PROLACTINA EM MULHERES NO PÓS-PARTO IMEDIATO

RESUMO
Objetivo: identificar os determinantes do nível de prolactina em mulheres no pós-parto imediato.
Método: estudo transversal realizado com 60 puérperas atendidas em um hospital referência no oeste de Santa Catarina. Foram realizadas a aplicação de questionário, Escala de Ansiedade Idate-Traço e coleta de prolactina por meio de punção venosa. Os dados foram analisados mediante regressão linear simples e múltipla.
Resultados: o nível médio de prolactina foi 268,38 ng/mL. O tempo de aleitamento durante a primeira hora de nascimento (p=0,000) e o tipo de parto (p=0,017) foram capazes de prever o desfecho do estudo, enquanto o tempo de puerpério em horas (p=0,088) e a ansiedade (p=0,170) não se mantiveram estatisticamente significativas no modelo final.
Conclusão: espera-se que o resultado desse estudo venha contribuir para estimular e encorajar a adoção de condutas favorecedoras na assistência prestada às mulheres.

DESCRITORES: Aleitamento Materno; Enfermagem; Prolactina; Saúde da Mulher; Período Pós-Parto.

DETERMINANTES DEL NIVEL DE PROLACTINA EN MUJERES EN EL POST-PARTO INMEDIATO

RESUMEN:
Objetivo: identificar los determinantes del nivel de prolactina presente en mujeres en el post-parto inmediato.
Método: estudio transversal realizado con 60 puérperas atendidas en un hospital de referencia del oeste de Santa Catarina. Se aplicó un cuestionario y la Escala de Ansiedad-Rasgo- Estado (IDARE); además, se recolectó prolactina por medio de punción venosa. Los datos se analizaron mediante regresión lineal simple y múltiple.
Resultados: el nivel medio de prolactina fue 268,38 ng/mL. El tiempo de lactancia durante la primera hora posterior al nacimiento (p=0,000) y el tipo de parto (p=0,017) permitieron prever el resultado del estudio mientras que la duración del puerperio en horas (p=0,088) y la ansiedad (p=0,170), presentaron significación estadística en el modelo final.
Conclusión: se espera que el resultado de este estudio pueda contribuir a estimular y fomentar la adopción de conductas que prioricen la asistencia que se presta a las mujeres.

DESCRIPTORES: Lactancia Materna; Enfermería; Prolactina; Salud de la Mujer; Período Postparto.

INTRODUCTION

Among postpartum mothers, breastfeeding has still been a problem due to the low offer of maternal milk or its production. There are several factors influencing the production of maternal milk, such as mammary anatomy, physiological, psychological factors related to baby sucking, nutritional status, and endocrine factors[1]. Several hormones and growth factors play roles in lactation, but high prolactin concentration is essential for achieving a mammary development and later breastfeeding[2].

The maternal levels of prolactin increase gradually during pregnancy, the physiological onset of labor, and in the early postpartum period[3], reaching their highest peak in the organism approximately 70 hours after birth[4]. In addition, the inhibitory effect of placental steroid hormones over prolactin vanishes right after placental separation, triggering the beginning of milk synthesis[5].

Although a correlation between the amount of milk produced and the maternal prolactin level is not yet well established, if they are observed one month after birth, the basal prolactin returns to pre-gestational levels in non-breastfeeding mothers, while it remains high in nursing mothers, with peaks in response to breastfeeding[6].

Some factors that interfere with breastfeeding maintenance are already widely discussed in the literature, such as the delivery route[7], the time for starting Maternal Breastfeeding (MB)[8], and anxiety[9]; however, whether these factors initially relate to prolactin deficiency is still not clear.

In this context, the identification of factors that relate to expected levels of prolactin in postpartum can subsidize conducts that favor maternal breastfeeding since, apart from support networks and psychological and mechanic factors, it is necessary to consider endocrine issues related to the breastfeeding process[2]. Considering all this, this study aims to identify the determinants of the prolactin level in immediate postpartum women.

METHOD

This is a cross-sectional study that is part of the project called "Floral essences: effects on pain relief, anxiety, clinical and neuroendocrine parameters of parturient and puerperal women", an experimental study whose objective is to identify factors associated with the breastfeeding process from the use of flower therapy.

The study was conducted in a regional hospital accredited by the Unified Health System (*Sistema Único de Saúde*, SUS) of the municipality, a reference for births in western Santa Catarina, with an annual mean of approximately 3,500 births, and surgical deliveries being responsible for more than 55% of these births.

Faced with the absence of previous studies that would allow estimating the prevalence of the prolactin hormone during the immediate postpartum, as a reference for sample size calculation the sample calculated for the base project was considered, that is, the sample size was calculated to test the difference between the groups (floral versus placebo), using a test for a difference of two means, for a significance level of 5% and a study power of 80%. To detect a difference of at least 1 hour and 30 minutes after the time elapsed between the first evaluation and after the intervention, 48 patients would be necessary. For possible losses, 20% more was added, which resulted in 60 women.

The participants were randomly selected among those who met the inclusion criteria, namely: being in joint accommodation and exclusively breastfeeding, gestational age in

term (between 37 and 42 complete weeks) calculated from the date of the last menstruation and/or by early ultrasound result, that is, that had taken place until the 13th week; minimum age of 18 years old; newborn (NB) weight over 2,500 kg; being between 3h and 24h of postpartum (vaginal or surgical) and not having been interrupted during breastfeeding.

All the puerperal women identified were invited to participate in the research and, after explaining objectives and procedures of the work, their signature in the Free and Informed Consent Form was requested upon agreement to participate. Those women were excluded who did not agree to participate or who had illnesses that could impair the evaluation (recorded mental disorders, psychoactive drug users, and women who reported feeling constrained in breastfeeding with the presence of a professional observing them).

Data collection took place from March to September 2018 during the hospitalization of the puerperal women. Socioeconomic, demographic, and health data were collected by recording the answers on forms previously tested in a pilot study with 10 puerperal women. The Idate-Trait Anxiety Scale was applied, which describes in 20 items how the participant feels in this moment in relation to the items presented in a 4-point Likert type scale: 1- absolutely not; 2- a little; 3- quite; 4- very much[10].

Prolactin was collected by venipuncture, and approximately five ml of blood was withdrawn from the cubital fossa by a properly trained team three hours after the first breastfeeding, when the prolactin level reaches its peak for gradual reduction[4]. The laboratory analysis was performed by the hospital itself, which facilitated the transportation of samples.

In the interview there was information about parity, considering nulliparous (no children) and multiparous (one to four children) women, type of delivery, skin to skin contact, breastfeeding in the first hour of life, and duration of the first feed in this interval in minutes. The puerperium time was measured in hours, considering from the time of birth until the moment of the interview.

The data were typed in independent double entry and analyzed with the help of the Statistical Package for Social Sciences (SPSS) program, version 20.0, later validated aiming at correcting imputation errors.

Once the Gaussian distribution (Kolmogorov-Smirnov test) and homogeneity of the error variances (Levene test) were identified, it was decided to perform multiple linear regression analysis to control the confounding variables. The prolactin level was considered as a dependent variable and the others, as explanatory variables. The univariate analysis was performed first and, to quantify the correlation between the dependent variable and the outcomes, the Pearson's correlation coefficient was calculated.

Variables with a significance level of $p<0.20$ were selected for multiple linear regression by significance order through the forward stepwise method, considering the plausible effect situations in the maternal prolactin level (delivery type, puerperium time, and duration of feeding in the first hour of life).

The variables whose regression coefficients presented a significance level below 5% ($p<0.05$) according to the Student's t-test were maintained in the final model.

The project was approved by the Research Ethics Committee of the Federal University of the South border, under opinion No. 2,548,970.

RESULTS

A total of 60 puerperal women (15 to 49 years old) with a mean age of 26.58 years (SD: 5.75 years old) were included. Most of the women had complete high school schooling,

were married, had an employment contract, owned a house, and had a monthly income of four minimum wages or less. The demographic and socioeconomic characteristics of the study participants are described in Table 1.

Table 1 - Demographic and socioeconomic characteristics of the women in joint accommodation. Chapecó, SC, Brazil, 2018

Variable	N	%
Age (years old)		
≤ 19	6	10
20 to 34	48	80
≥ 35	6	10
Schooling		
Elementary School	6	10
High School	42	70
Higher Education	12	20
Marital status		
No partner	7	11.7
Has a partner	53	88.3
Employment contract		
No	29	48.3
Yes	31	51.7
Housing condition		
Own home	36	60
Rented	24	40
Income (minimum wages)		
Wage earner	13	21.7
Benefits	2	3.4
> 4	1	1.7
≤ 4	44	73.3

The mean prolactin level was 268.38 ng/mL (SD: 103.18 ng/mL), and the stratification according to the obstetric and health characteristics of the puerperal women in joint accommodation is described in Table 2. There was a statistically significant difference between the means of prolactin level according to the type of delivery; however, the difference was not significant for parity and skin to skin contact.

Table 2 - Mean and standard deviation of prolactin according to the obstetric and health characteristics in puerperal women admitted to joint accommodation. Chapecó, SC, Brazil, 2018

Variable	n (%)	Prolactin (ng/mL)	
		Mean (SD)	p-value[a]
Type of delivery			
Normal	30	299.88 (105.11)	**0.017**
Cesarean section	30	236.88 (92.46)	
Parity			
Nulliparous	25	280.55 (108.44)	0.415
Multiparous	34	258.00 (100.93)	
Skin to skin contact			
Yes	35	267.02 (108.25)	0.905
No	25	270.28 (97.79)	

a t Test

The mean puerperium time was 13.40 hours (SD: 5.37 hours), and the intensity of the anxiety assessed by means of the IDATE-Trait scale had a mean of 34.40 points (SD: 9.74 points). Simple linear regression analysis identified that these two variables were able to predict the level of prolactin individually, as well as the breastfeeding time in minutes during the first hour of life and the type of delivery (Table 3).

Table 3 - Correlation coefficient between the prolactin level in puerperal women according to the maternal characteristics. Chapecó, SC, Brazil, 2018

Variable	Mean (SD)	r	p-value[a]
Age (years old)	26.58 (5.75)	- 0.118	0.302
Puerperium time (hours)	13.40 (5.37)	0.307	0.009
Breastfeeding time (minutes)	28.23 (7.04)	0.832	0.000
Type of delivery	0.50 (0.50)	0.716	0.000
Anxiety	34.40 (9.74)	-0.274	0.017

a Pearson's correlation

The multiple linear regression analysis resulted in a statically significant adjusted final model ($F(3.56) = 42.49$, $p = 0.000$, and $R2 = 0.765$), capable of explaining nearly 76% of the variance in the prolactin level in puerperal women during the immediate puerperium. The breastfeeding time during the first hour after birth, as well as the type of delivery, was able to predict the outcome of the study. On the other hand, the puerperium time in hours and anxiety did not remain statistically significant in the final model (Table 4).

Table 4 - Adjustment of the multiple linear regression models to the prolactin level in puerperal women according to the maternal characteristics. Chapecó, SC, Brazil, 2018

	B	T	p-value	R2	F	p-value	Tolerance	VIF
Model 1[a]				0.692	130.43	**0.000**		
(Constant)	-74.22	-2.40	0.020					
Breastfeeding time	12.13	11.42	**0.000**				1.00	1.00
Model 2[b]				0.736	79.47	**0.000**		
(Constant)	-24.41	-0.73	0.464					
Breastfeeding time	9.34	6.94	**0.000**				0.54	1.83
Type of delivery	58.06	3.07	**0.003**				0.54	1.83
Model 3[c]				0.747	55.09	**0.000**		
(Constant)	5.35	0.141	0.888					
Breastfeeding time	9.43	7.09	**0.000**				0.54	1.83
Type of delivery	50.00	2.58	**0.012**				0.50	1.97
Puerperium time	-2.11	-1.55	0.126				0.89	1.11
Model 4[d]				0.765	42.49	**0.000**		
(Constant)	51.69	1.02	0.308					
Breastfeeding time	9.20	6.92	**0.000**				0.53	1.86
Type of delivery	47.51	2.46	**0.017**				0.50	1.99
Puerperium time	-2.37	-1.74	0.088				0.88	1.13
Anxiety	-1.02	-1.39	0.170				0.92	1.07

a Predictor: (Constant, breastfeeding time in minutes).
b Predictor: (Constant, breastfeeding time in minutes, adjusted by type of delivery).
c Predictor: (Constant, breastfeeding time in minutes, adjusted by type of delivery, adjusted by the puerperium time in hours).
d Predictor: (Constant, breastfeeding time in minutes, adjusted by type of delivery, adjusted by the puerperium time in hours, adjusted by anxiety).

On average, each minute in the breastfeeding time in the first hour of life increases the prolactin level by 9.43 ng/mL. In view of the birth route, the prolactin level increases a mean of 47.51 ng/mL in normal delivery compared to the cesarean section.

Thus, the estimated regression line can be written as follows: Prolactin level = 51.69 + 9.20 x (breastfeeding time) + 47.51 x (type of delivery), considering 01 (one) for normal delivery and 0 (zero) for cesarean section.

Therefore, to predict the prolactin level in a puerperal woman who, during the first hour of life of the NB, breastfed for nearly 40 minutes and had a normal delivery, we have a prolactin level of 467.20 ng/mL. On the other hand, a puerperal woman whose delivery route was surgical, having the same breastfeeding time, the prolactin level will be 419.69 ng/ml.

In the final adjusted model, the puerperium time (hours) and the level of anxiety do not seem to influence the level of prolactin in this study.

DISCUSSION

The mean level of prolactin found in the study was 268.38 ng/mL, reasserting previous findings listed in which the prolactin levels during the first 10 days of lactation have a mean line of approximately 200, with peak levels that can reach 400 ng/dL after breastfeeding[11]. A study conducted in a university in North Carolina, with the objective of assessing the prolactin levels in women that were exclusively breastfeeding their babies, demonstrated an increase of up to eight times in the prolactin values after breastfeeding when compared to basal values[12].

Suction is the main stimulus to prolactin secretion. During breastfeeding, nerve signals are sent from the nipple to the hypothalamus, promoting nearly 10 to 20 times greater prolactin secretion[1].

However, isolated suction is not able to increase prolactin levels and nipple secretion, as demonstrated in the Brazilian case of a pregnant-for-hire mother, who received drug induction for 20 days, combined with suction by the newborn, followed by mechanic stimulation of the nipple for 39 days. After the observation period, the prolactin basal levels remained unaltered, with scarce nipple secretion; however, the mother expressed high satisfaction in the period of four weeks in which she could experience breastfeeding[13].

Despite some factors under study were associated with the prolactin level individually in the researched population, when multiply analyzed, they do not seem to influence in the studied outcome, as in the case of puerperal time (hour) and the anxiety level.

In contrast, the breastfeeding time during the first hour after birth, as well as the type of delivery, were able to predict the outcome of the study. A meta-analysis of 46 studies showed that early breastfeeding, that is, the one started within the first hour of a child's life, helps to improve multi-sensory stimulation and promotes a prolonged period of lactation[14]. Physical contact between the mother and the baby, as well as the contact of child's lips with the nipple[15], promotes the same effect.

In Paraná, a number of professionals who provide assistance to the parturient woman and the baby listed some barriers considered as impeding for maternal breastfeeding in the first hour of life, namely: divergence of opinions and conducts among the health team members, high demand in opposition to the insufficient number of professionals, fragmented routine which makes the mother-baby dyad view impossible, and the delivery care model[16].

The type of delivery was also related to prolactin secretion in that study. Corroborating that finding, a research study conducted in Italy measured the prolactin levels 36 hours after vaginal deliveries, and after elective and emergency cesarean sections, finding 47 ng/dL, 236 ng/dL, and 215 ng/dL, respectively. In addition to evidencing the superiority of vaginal delivery with regard to prolactin levels, this study found that hormones have an important and statistically significant role in early exclusive maternal breastfeeding[17]. Furthermore, the prevalence of breastfeeding in the delivery room was higher in vaginal deliveries, whereas cesarean births showed a great negative impact in breastfeeding prevalence on the seventh day and in the third month following delivery[17].

Despite not having found any statistically significant change in the prolactin levels, another international study agrees that the breastfeeding start rates are lower in babies born from a cesarean, when compared to vaginal delivery, the former being considered a risk factor for late lactogenesis. The same study asserts that the mothers undergoing a cesarean section were more likely to need help to start breastfeeding[18].

The discussion and comparison of the findings of this research were limited by the incipiency of studies that addressed the subject in human beings. The sample size may have influenced the behavior of the variables, configuring itself as a limitation of the study.

CONCLUSION

Breastfeeding time during the first hour after birth and the type of delivery were among the factors studied that determined the level of prolactin in women in the immediate postpartum period.

The results of this study are expected to contribute to stimulating and encouraging the adoption of conducts which favor prolactin production. In this sense, it can subsidize and direct the care provided, as much as in the development of prenatal care, when discussions begin on the type of delivery chosen by the pregnant woman, as in the health service and the team that will assist the delivery. It should be noted that institutions accredited as Friends of children and Friends of women favor the adherence to these practices, given the institutionalization of rules concerning the title.

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Corresponding author:
Érica de Brito Pitilin
Universidade Federal da Fronteira Sul
Rd. SC 484 Km 02 - Chapecó, SC, Brasil
E-mail: erica.pitilin@uffs.edu.br

Role of Authors:
Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - EBP, VAG, MDB, MHL
Final approval of the version to be published - EBP, VAG, MDB, MHL

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