

Perineal trauma in nulliparous women and its associated factors

Rebeca Vieira dos Santos¹, Alianny Raphaely Rodrigues Pereira¹, Cláudia Regina Oliveira de Paiva Lima², Diego de Sousa Dantas¹, Caroline Wanderley Souto Ferreira¹

¹Departamento de Fisioterapia, Universidade Federal de Pernambuco (UFPE) – Recife (PE), Brazil

²Departamento de Estatística, UFPE - Recife (PE), Brazil

ABSTRACT

Introduction: Perineal trauma is an important complication for women after giving birth. **Objective:** To evaluate the prevalence of perineal trauma and its associated factors in nulliparous. **Methods:** A retrospective cohort study was carried out, through the analysis of the medical records of women with singleton pregnancy who achieved vaginal birth of a live infant, in 2017, in a maternity hospital. Data collection involved information about demographic, obstetric, and clinical data from nulliparous women, and infant birthweight. Univariate and multivariate logistic analyses were performed to verify the association of perineal trauma with the variables assessed, with significant variables remaining in the model ($p < 0.05$), through a stepwise strategy. **Results:** A total of 326 medical records were analyzed. The percentage of perineal trauma was 60%. In the multivariate analysis, the use of oxytocin increased the chance of perineal trauma by 730%. In addition, the adoption of squatting position and hands and knees decreased the chances of perineal trauma by 81% and 97%, respectively, in comparison with those who adopted the lithotomy position, during the second stage labor. **Conclusion:** The rate of perineal laceration was high, but the severity was low. The use of oxytocin is associated with the presence of trauma and the squatting position and hands and knees, especially, have contributed to the protection of the perineum.

Keywords: perineum; oxytocin; posture; birth injuries; episiotomy.

INTRODUCTION

Despite the many benefits of vaginal birth, this procedure must be very well conducted to avoid pelvic floor injuries. Complications due to perineal trauma can happen immediately, such as pain, hemorrhage, infection, and trauma of the pelvic floor muscles, as well as belatedly, such as sexual dysfunction, urinary and/or fecal incontinence. Any of these complications will negatively impact a women's daily and professional life activity¹.

During the 1960's, many studies about the effect of maternal posture during labor on important outcomes for the parturient women and the fetus were published^{2,3}. In a Cochrane review involving 22 studies and 7,280 women, it was found that vertical positions in labor resulted in a decrease of 12% in assisted births and lowered the incidence of episiotomy, when compared to supine posture⁴.

Spontaneous lacerations are classified as first degree when they affect the skin and mucosa; second degree when they extend to the perineal muscles; third degree when

How to cite this article: Santos et al. Perineal trauma in nulliparous women and its associated factors. ABCS Health Sci. 2021;46:e021224. <https://doi.org/10.7322/abcshs.2020047.1496>

Received: May 22, 2020
Revised: Oct 29, 2020
Approved: Dec 08, 2020

Corresponding Author: Caroline Wanderley Souto Ferreira - Departamento de Fisioterapia, Centro de Ciências da Saúde, Universidade Federal de Pernambuco - Avenida Professor Moraes Rego, 1235 - Cidade Universitária - CEP: 50670-901 - Recife (PE), Brazil - E-mail: caroline.wanderley@ufpe.br; caroline.wanderley@hotmail.com

Declaration of interests: nothing to declare



This is an open access article distributed under the terms of the Creative Commons Attribution License
©2021 The authors

they reach the sphincter muscle of the anus; and fourth degree when the lesion of the perineum involves the anal sphincter and epithelium. In episiotomy, a surgical enlargement of the posterior face of the vagina leads to damage to the skin and mucosa; as well as the superficial transverse muscles of the perineum and bulbocavernosus⁵.

To decrease the incidence of third- and fourth-degree lacerations, the American College of Obstetricians and Gynecologists recommends the application of warm perineal compresses during pushing (with a level A rating of evidence) and perineal massage during the second stage of labor (with a level B rating of evidence)⁵.

Since perineal trauma is a serious complication for women after giving birth, it is important to find how to prevent it; so, the objective of this study is to evaluate the prevalence of perineal trauma and its associated factors in nulliparous women.

METHODS

It is a retrospective cohort study, performed through secondary analysis of medical records of women who gave birth in 2017, in a maternity hospital in the city of Recife, Pernambuco, Brazil. This study complied with the standards required by Resolution 466/12 of the Brazilian Health Council and was approved by the Human Research Ethics Committee of Universidade Federal de Pernambuco, in 02/10/2018, under CAAE: 98416818.7.0000.5208.

The sample size calculation was performed considering a prevalence of 45.5% for spontaneous perineal trauma⁶, a rate of 2400 deliveries per year, an average of 200 deliveries per month at the maternity hospital of the study, a standard error of 5% and a confidence level of 95%, resulting in a sample of 326 medical records.

For the selection of medical records, a systematic random sampling was adopted. The first one was selected followed systematically by every six patients. When the medical record did not meet the eligibility criteria, the next record was used. The medical records were organized by date of delivery.

In this study, medical records of women with singleton pregnancy who achieved vaginal birth of a live infant were included. Medical records of women with a history of previous childbirth and/or gynecological surgery, as well as medical records with incomplete or missing data were excluded.

One form with socio-demographic, obstetric and gynecological information was used to collect data. The dependent variable was the presence perineal trauma. The independent variables were: maternal age, gestational age (preterm: less than 37 weeks; term: from 37 weeks to less than 42 complete weeks; post-term: 42 complete or more weeks of gestation); oxytocin, use of pharmacological analgesia, maternal position during birth, forceps usage, infant birthweight, episiotomy, presence of perineal trauma and grade (1st, 2nd, 3rd and 4th degree laceration)⁵. The women's ages were

organized into three age groups (group 1: 11-19; group 2: 20-34; and group 3: from 35 years old). The infant birthweight was given in grams (g) and it was categorized into three groups: low (below 2,500g); appropriate (from 2,500g to 3,999g) and high (greater than or equal to 4,000g)⁷.

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS), version 20.0. Data were given as means and their standard deviations for quantitative variables. Some of these variables were categorized and then the absolute and relative frequencies were obtained. To analyze the association between perineal trauma and independent variables, bivariate regression was initially performed, and then multiple logistic regression analysis was performed using the stepwise method to select the variables. In both analyses, the Risk Ratio, 95% Confidence Interval and 5% significance level were calculated.

RESULTS

Out of 567 records selected, 326 were analyzed (Figure 1). The sample age ranged from 11 to 37 years, with mean and standard deviation of 22.08 ± 5.35 years and 74% completed high school. Most women gave birth at term (98%), did not use oxytocin (80%), did not use analgesia (95%), did not need forceps (99%), nor episiotomy (87%) and placed themselves in lithotomy in the expulsive period (79%). The prevalence of perineal trauma was 60% (194). Of these 194 women, 52% were classified as first grade and 46% did not have the grade of laceration recorded in the medical records (Table 1).

The infant birthweight had a mean and standard deviation of $2,923 \pm 771.55$ g, with a minimum value of 1,300 and a maximum value of 4,300 g. Most of them were classified as normal weight (70%) (Table 2).

The univariate and multivariate logistic regression analyses are shown in Table 3. In the multivariate analysis, only the variables oxytocin usage and Maternal position at second stage of labor were statistically significant. It was observed that women who adopted the positions hands and knees and squatting were 97% and 81%, respectively, less likely to have perineal trauma than those

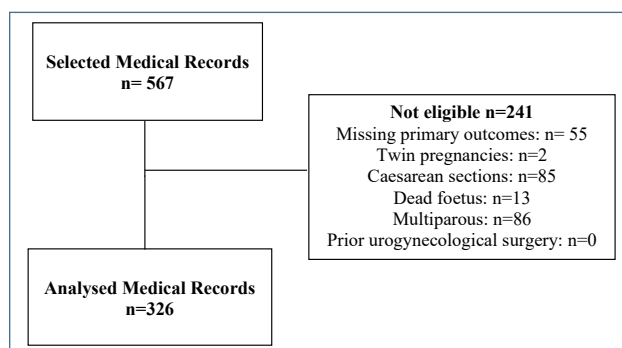


Figure 1: Sampling process flowchart.

Table 1: Socio-demographic, obstetric and gynecological characteristics of the parturient.

Variables	Number (n)	Percentage (%)
Maternal Age (years)		
11-19	118	36
20-34	200	61
35-37	8	3
Maternal education (Years of study)		
12	242	74
9	84	26
Gestational age		
Preterm (<37 weeks)	7	2
Term (from 37 to < 42 complete weeks)	319	98
Oxytocin usage		
Yes	64	20
No	262	80
Analgesia usage		
Yes	17	5
No	309	95
Maternal position at second stage		
Lithotomy	258	79
Squatting	17	5
Hands-and-knees	13	4
Not specified	38	12
Forceps usage		
Yes	2	1
No	324	99
Episiotomy		
Yes	43	13
No	283	87
Perineal injury		
Yes	194	60
No	132	40
Laceration grade		
1° grade	102	52
2° grade	0	0
3° grade	2	1
4° grade	1	1
Not specified	89	46

Table 2: Infant birthweight.

Infant birthweight (g)	Number (n)	Percentage (%)
Low (<2,500)	89	27
Appropriate (2,500-3,999)	228	70
High (≥4,000)	9	3

who adopted the lithotomy position, during the expulsive period. Women who used oxytocin were 8.3 times (730%) more likely to have perineal trauma (Table 3).

DISCUSSION

In this study, it was found that the prevalence of perineal trauma was 60%. The use of oxytocin in labor increased the chances

of perineal trauma by 8.3 times or 730%, while the adoption of hands and knees and squatting positions decreased the chances of perineal trauma, by 97% and 81%, respectively, in comparison with those who adopted the lithotomy position, during the expulsive period.

Although other variables, such as age between 11 and 19 years, episiotomy, and infant birthweight were initially associated with the outcome, in the multivariate logistic regression model, they lost their association.

The perineal trauma rate of this study was high (60%) when compared to other studies^{8,9}. In these studies^{8,9}, the prevalence found was 25% and 4.5% respectively, the authors evaluated the prevalence and risk factors for severe perineal trauma, in other words, third and fourth degree. In the present study, we did not restrict the degree of laceration and the study population had as its main characteristic, being nulliparous, which contributed to a higher percentage of this obstetric trauma, thus reinforcing the evidence that primiparity predisposes women to perineal trauma^{5,10}.

Even though the use of oxytocin during labor is an obstetric violence, it is still a common practice to reduce the time of labor, especially in nulliparous women, where the birth is usually longer, more difficult, and more likely to present complications¹¹. Although in the present study the rate of oxytocin usage was not acceptable, it was low (20%) compared with others, reaching more than 40%¹², the use of oxytocin considerably increased the chances of perineal trauma. This fact may be explained by the action of oxytocin, which, depending on plasma levels, may lead to overstimulation of the uterus causing an abrupt cephalic detachment, resulting in perineal trauma¹³.

Regarding the position adopted in the expulsive phase, in the present study, it is evident that women who gave birth in lithotomy presented a higher percentage of perineal trauma, while squatting and hands and knees positions were responsible for a lower incidence of this obstetric outcome, being considered protective positions.

Our results are in line with previous research, that states that vertical position during vaginal birth is a factor that favors the action of gravity on fetal displacement, increasing fetal body pressure on the lower pelvis and uterine cervix; also increasing the intensity and frequency of contractions, making them more effective and thus contributing to a shorter duration of labor, with a consequent decrease in the risk of perineal trauma and instrumental birth^{14,15}.

The squatting position offers numerous benefits to women during birth labor, as it increases the anteroposterior and transverse diameters of the pelvis, favors greater comfort to the parturient, in addition to widening the lower pelvis, decreasing the tension of the pelvic floor muscles^{16,17}.

Although there are not many studies checking the association between the hands and knees posture, during the second stage of

Table 3: Association of laceration prevalence with variables analyzed.

Variables	With Laceration n (%)	Without Laceration n (%)	Univariate analysis		Multivariate analysis	
			OR [CI 95%]	p	OR [CI 95%]	p
Gestational age						
Pre-term	3 (43)	4 (57)		0.36	-	-
Term	191 (60)	128 (40)	1.99 [0.44;9.04]			
Oxytocin usage						
Yes	58 (91)	6 (9)	8.96 [3.73;21.48]	<0.01	8.3 [3.06;22.49]	<0.01
No	136 (52)	126 (48)				
Analgesia usage						
Yes	17 (100)	0 (0)	1.2×10 ⁹ [*]	>0.99	-	-
No	177 (57)	132 (43)				
Maternal position at second stage^a						
Squatting	4 (24)	13 (76)	0.14 [0.04;0.45]	0.01	0.19 [0.06;0.63]	0.01
Hands-and-knees	1 (8)	12 (92)	0.04 [0.01;0.30]	0.04	0.03 [0.01;0.33]	<0.01
Lithotomy	176 (68)	82 (32)				
Episiotomy						
Yes	39 (91)	4 (9)	8.05 [2.80;23.13]	<0.01	-	-
No	155 (55)	128 (45)				
Forceps usage						
Yes	2 (100)	0 (0)	1.1×10 ⁹ [*]	0.52	-	-
No	192 (59)	132 (41)				
Infant birthweight						
Low (<2500)	40 (45)	49 (55)				
Appropriate (2500-3999)	148(65)	80 (35)	2.27 [1.38;3.73]	<0.01	-	-
High (≥4000)	6 (67)	3 (33)	2.45 [0.58;10.42]	0.22	-	-
Maternal Age (years)						
11-19	80 (68)	38 (32)	1.69 [1.05;2.72]	0.03	-	-
20-34	111 (56)	89 (44)				
35-37	3 (38)	5 (62)	0.48 [0.11;2.07]	0.32	-	-
Maternal education (Years of study)						
9	56 (67)	28 (33)	0.66 [0.39;1.12]	0.12	-	-
12	138 (57)	104 (43)				

^aN=288, 38 missing data. n: Absolute frequency; %: Relative frequency; OR: Odds Ratio; CI: Confidence interval; binary regression and multiple regression analysis; p<0.05. *Not submitted to statistical test for presenting a quad without observation.

labor, and the perineal trauma, this posture brings many benefits for women and fetus during labor¹⁸. Among them, it enables a better perception of the pelvic movement¹⁹.

The hands and knees posture decreases the low back pain during labor, and there is little evidence of its association with perineal protection. However, it is believed that it helps in the relaxation of the pelvic floor, due to the better fitting of the femoral head in the acetabular space, during flexion of the hip joint²⁰.

As for the biomechanical benefits that this position offers, some authors claim that the pelvis resting on the femoral heads allows it to be freer, the iliac bones can better adapt to the shape of the fetus, and the sacrum is also free, allowing movements of nutation and counternutation. Moreover, when the fetal head is seated, this position can facilitate fetal unwinding during passage through the birth canal and during detachment, the pelvis fits better with the foetus²¹.

It was shown that most parturient adopted the lithotomy posture, during the expulsive period, which seems to be a cultural problem and a lack of knowledge, as well, on the part of women and health professionals. In a preliminary study²² on the culture

of immobilization in parturient women, it was evidenced that most professionals discussed and guided the birth positions, but the position most chosen by women was lithotomy, because of the lack of knowledge of other positions and because it is culturally the most common. The study also reported the resistance of health professionals to encourage women to adopt vertical postures during labor.

As the female pelvis ages and develops, fusion of sequential bone structures occurs²³ and structural underdevelopment of the pelvis would increase the chances of trauma to the pelvic floor of adolescent or younger women, but in the present study there was no association of maternal age with the occurrence of perineal trauma.

In the literature, variables such as gestational age⁵, high infant birthweight^{24,25}, use of forceps²⁶ and use of analgesia^{27,28} are associated with perineal trauma. However, in this study these associations were not confirmed, probably due to the low occurrence of these outcomes.

The episiotomy rate in the present study was not low (13%); however, it shows that the use of episiotomy as a routine procedure

is decreasing, since in the literature the rates of use of this procedure in nulliparous are much higher (94.2%)²⁸. Therefore, we conclude that the maternity did not use episiotomy routinely but selectively, as recommended by the Ministry of Health⁷, because this procedure, when used, already causes second degree laceration²⁹. In a previous study with 40 nulliparous submitted to routine or selective episiotomy, it was found that 80% of the selective group had intact perineum or suffered first degree laceration, thus evidencing that the use of selective episiotomy favors the reduction of perineal trauma³⁰.

A limitation of our study was the missing data in some outcomes, that is the duration of the second stage of labor; and the lack of notification of the degree of laceration in 46% of nulliparous. However, it is something expected in retrospective studies, using medical records; so, it wasn't possible to check the association between duration of the second stage of labor with perineal trauma, which has already been shown^{6,31}.

The strengths of our study were the right sample size, the randomization to select the medical records and the robust statistical analyses that enabled us to be confident about the results.

Conclusion

The prevalence of perineal trauma was 60% and the practice of using oxytocin in labor increased the chance of perineal trauma by 8.3 times or 730%. On the other hand, the adoption of hands and knees and squatting positions during labor decreased the chances of perineal trauma, by 81% and 97%, respectively, in comparison with those who adopted the lithotomy position, during the second stage labor.

These findings bring new relevant data to the discussion of the health professionals that performs childbirth care, with a view to the adoption, whenever clinically viable, of feasible practices such as the modification of the posture of childbirth, with the stimulation of the hands and knees and squatting positions, and the rational use of oxytocin in order to reduce the occurrence of perineal trauma.

ACKNOWLEDGMENTS

The Authors wish to thank the support given by the maternity staff during data collection and Mr. Craig Bernard Donnelly for proofreading the manuscript.

REFERENCES

- Moore KL, Dalley AF, Agur AMR. Anatomia orientada para a clínica. 7 ed. Rio de Janeiro: Guanabara Koogan, 2014.
- Russel JG. Moulding of the pelvic outlet. *Obstet Gynaecol Br Commonw.* 1969;76(9):817-20. <https://doi.org/10.1111/j.1471-0528.1969.tb06185.x>
- Mitie IN. The influence of maternal position on duration of the active phase of labor. *Int J Gynaecol Obstet.* 1974;12(5):181-3. <https://doi.org/10.1002/j.1879-3479.1974.tb00945>
- Kemp E, Kingswood CJ, Kibuka M, Thornton JG. Position in the second stage of labor for women with epidural anaesthesia. *Cochrane Database Syst Rev.* 2013;(1):CD008070. <https://doi.org/10.1002/14651858.CD008070.pub2>
- Committee on Practice Bulletins-Obstetrics. ACOG Practice Bulletin no. 198: prevention and management of obstetric lacerations at vaginal delivery. *Obstet Gynecol.* 2018;132(3):e87-102. <https://doi.org/10.1097/AOG.0000000000002841>
- Riesco MLG, Costa ASC, Almeida SFS, Basile ALO, Oliveira SMJV. Episiotomia, laceração e integridade perineal em partos normais: análise de fatores associados. *Rev Enferm UERJ.* 2011;19(1):77-83.
- Brasil. Ministério da Saúde. Secretaria de Ciência, Tecnologia e Insumos Estratégicos. Departamento de Gestão e Incorporação de Tecnologias em Saúde. Diretrizes Nacionais de Assistência ao Parto Normal. Brasília: Ministério da Saúde, 2017.
- Hals E, Oian P, Pirhonen T, Gissler M, Hjelle S, Nilsen EB, *et al.* A multicenter interventional program to reduce the incidence of anal sphincter tears. *Obstet Gynecol.* 2010;116(4):901-8. <https://doi.org/10.1097/AOG.0b013e3181eda77a>
- Grouz A, Hasson J, Wengier A, Skornick-Rapaport A, Lessing JB, Gordon D. Third- and fourth-degree perineal tears: prevalence and risk factors in the third millennium. *Am J Obstet Gynecol.* 2011;204(4):P347.e1-347.e4. <https://doi.org/10.1016/j.ajog.2010.11.019>
- Francisco AA, Oliveira SMJV, Santos JO, Silva FMB. Avaliação e tratamento da dor perineal no pós-parto vaginal. *Acta Paul Enferm.* 2011;24(1):94-100. <https://doi.org/10.1590/S0103-21002011000100014>
- Hidalgo LP, Hidalgo MM, Rodrigues BMA. Labor stimulation with oxytocin: effects on obstetrical and neonatal outcomes. *Rev Latino-Am Enfermagem.* 2016;(24):27-44. <https://doi.org/10.1590/1518-8345.0765.2744>
- Oliveira LB, Mattos DV, Matão MEL, Martins CA. Laceração perineal associada ao uso de ocitocina exógena. *Rev Enferm UFPE.* 2017;8(1):2273-8. <https://doi.org/10.5205/1981-8963-v11i6a23387p2273-2278-2017>
- Jonsson M. Induction of twin pregnancy and the risk of caesarean delivery: a cohort study. *BMC Pregnancy Childbirth.* 2015;15:136. <https://doi.org/10.1186/s12884-015-0566-4>
- Lawrence A, Lewis L, Hofmeyr GJ, Dowswell T, Styles C. Maternal positions and mobility during first stage labor. *Cochrane Database Syst Rev.* 2009;(2):CD003934. <https://doi.org/10.1002/14651858.CD003934.pub2>
- Gizzo S, Gangi S, Noventa M, Bacile V, Zambon A, Nardeli GB. Women's choice of positions during labor: return to the past or a modern way to give birth? A cohort study in Italy. *Biomed Res Int.* 2014;2014:638093. <https://doi.org/10.1155/2014/638093>

16. Calais GB. O períneo feminino e o parto. Elementos de anatomia e exercícios práticos. São Paulo: Manole, 2005.
17. Kapandiji IA. Fisiologia articular: Esquemas comentados de mecânica humana. 6 ed. Rio de Janeiro: Guanabara Koogan, 2009.
18. Freitas JMS, Narchi NZ, Fernandes RAQ. Práticas obstétricas em centro de parto normal intra-hospitalar realizadas por enfermeiras obstetras. *Esc. Anna Nery*. 2019;23(4):e20190112. <https://doi.org/10.1590/2177-9465-2019-0112>
19. Lemos A. Fisioterapia obstétrica baseada em evidência. Rio de Janeiro: MedBook, 2014.
20. Lee DG, Hodges P. The pelvic girdle: an approach to the examination and treatment of the lumbopelvic-hip region. 3rd ed. United Kingdom: Churchill Livingstone, 2004.
21. Calais GB, Parés N. A pelve feminina e o parto. São Paulo: Manole, 2013.
22. Leal MC, Bittencourt SA, Esteves-Pereira AP, Ayres BVS, Silva LBRAA, Thomaz EBAF, *et al*. Avanços na assistência ao parto no Brasil: resultados preliminares de dois estudos avaliativos. *Cad Saude Publica*. 2019;35(7):e00223018. <https://doi.org/10.1590/0102-311x00223018>
23. Stenpheson R, O'Conner L. Obstetric and gynecological care in physical therapy. Second Ed. Slack, EUA: Slack, 2000.
24. Koyanagi A, Zhang J, Dagvador A, Hirayama F, Shibuya K, Souza JP, *et al*. Macrosomia in 23 developing countries: An analysis of a multicountry, facility-based, cross-sectional survey. *Lancet*. 2013;381(9865):476-83. [https://doi.org/10.1016/S0140-6736\(12\)61605-5](https://doi.org/10.1016/S0140-6736(12)61605-5)
25. Gyurkovits Z, Kálló K, Bakki J, Katona M, Bitó T, Pál A, *et al*. Neonatal outcome of macrosomic infants: An analysis of a two-year period. *Eur J Obstet Gynecol Reprod Biol*. 2011;159(2):289-92. <https://doi.org/10.1016/j.ejogrb.2011.08.003>
26. Simic M, Cnattingius S, Petersson G, Anna Sandström A, Stephansson O. Duration of second stage of labor and instrumental delivery as risk factors for severe perineal lacerations: population-based study. *BMC Pregnancy Childbirth*. 2017;17(1):72. <https://doi.org/10.1186/s12884-017-1251-6>
27. Smith LA, Price N, Simonite V, Burns EE. Incidence of and risk factors for perineal trauma: a prospective observational study. *BMC Pregnancy Childbirth*. 2013;13:59. <https://doi.org/10.1186/1471-2393-13-59>
28. Althabe F, Belizan JM, Bergel E. Episiotomy rates in primiparous women in Latin American: hospital based descriptive study. *BMJ*. 2002;324(7343):945-46. <https://doi.org/10.1136/bmj.324.7343.945>
29. Amorim MM, Franca-Neto FA, Leal VM. Is it possible to never perform episiotomy during vaginal delivery?. *Obstet Gynecol*. 2014;385. <https://doi.org/10.1097/01.AOG.0000447314.51968.54>
30. Shahraki AD, Aram S, Pourkabirian S, Khodae S, Choupannejad S. A comparison between early maternal and neonatal complications of restrictive episiotomy and routine episiotomy in primiparous vaginal delivery. *J Res Med Sci*. 2011;16(12):1583-9.
31. Loewenberg-Weisband Y, Grisaru-Granovsky S, Ioscovich A, Samueloff A, Calderon-Margalit R. Epidural analgesia and severe perineal tears: a literature review and large cohort study. *J Matern Fetal Neonatal Med*. 2014;27(18):1864-9. <https://doi.org/10.3109/14767058.2014.889113>