



## Vertical posture and perineal tears in humanized childbirths

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### Abstract

*Objectives: to determine the association between vertical childbirth posture and grade II or higher perineal tears in women attended under a humanized model.*

*Methods: 715 clinical records of humanized deliveries attended between 2016 and 2022 in Viña del Mar, Chile, were studied using bivariate analysis and binary logistic regression.*

*Results: 64.1% of the women presented perineal lesions, mainly low grade (51.2%). Second degree tears or more represented 12.2% (mostly grade II), with very few grade III tears (0.7%) and zero grade IV tears. Vertical postures, compared to horizontal ones, were significantly associated with the presence of grade II tears or more ( $p=0.02$ ), even after adjusting for maternal and neonatal variables ( $OR=2.31$ ,  $CI95\%=1.11-4.81$ ). Of the latter, parity and size of the newborn were the factors most associated with this type of injury.*

*Conclusion: humanized childbirths in general present less frequency and severity of perineal injuries than what is reported in traditional care; however, upright postures, compared to horizontal ones, were significantly associated with the presence of grade II or higher tears.*

**Key words** *Humanizing delivery, Home childbirth, Posture, Pelvic floor*



## Introduction

Comparing to the rest of Latin American and Caribbean countries, Chile has low maternal and infant mortality rates.<sup>1-3</sup> However, maternal morbidity associated with childbirth care is high, with 91% of induced deliveries, 55% with continuous fetal monitoring, 56% with episiotomies and 80% assisted in lithotomy position.<sup>4</sup> In addition, a study conducted in 2018,<sup>5</sup> indicated that women felt poorly informed and listened to, and, even, mistreated during care. For this reason, the World Health Organization (WHO) has guidelines in favor of humanized childbirth, for example, accompanied, respectful and informed childbirths, which favor the spontaneity of the process for greater maternal-fetal well-being.<sup>6,7</sup>

During the last decade, the number of births attended at a Chilean private health sector increased from 21% to 32%,<sup>2</sup> which could be related to the increase in home births. If in 2003 there were 20 assistances per year, in 2017 there were more than 30 per month, with low rates of maternal or neonatal complications (2%), episiotomies (2.3%) and perineal tears (32.2%), which, for the most part, were mild or first degree (99.4%).<sup>8</sup>

Numerous factors influence the development of perineal injuries during labor, including stressed urinary incontinence, home delivery, forceps use, prolonged expulsive period of labor, type of pushing, routine episiotomy, family history of pelvic floor dysfunction, induction of labor, vacuum extraction and fetal head circumference equal to or greater than 35cm.<sup>9-11</sup> Therefore, childbirth in the correct position benefits the mother and the newborn,<sup>12-14</sup> with fewer interventions and postpartum care.<sup>15,16</sup>

Upright, or flexible sacral posture during the second stage of labor enhances uterine labor by gravity and pelvic expansion,<sup>15</sup> decreasing compression of the maternal aorta.<sup>16,17</sup> Among the benefits following an upright delivery, shorter length of labor and reduced rates of episiotomy and assisted delivery have been reported. However, when compared to horizontal postures, there is a greater risk of stage II tears and blood loss of more than 500 ml.<sup>2,8,11,18</sup> Despite this, studies with Chilean women have shown that these injuries are less frequent in humanized childbirths than in traditional care.<sup>2</sup>

Humanized childbirth care is a growing trend, due to its benefits in labor and the reduction of maternal and neonatal risks.<sup>2,6,7</sup> However, the vertical posture, frequent in this type of care, could favor pelvic floor muscle injuries,<sup>15</sup> although the evidence is contradictory.<sup>2,8</sup> Therefore, the objective of this study was to determine the association between the type of posture adopted during labor and the occurrence of stage II or higher perineal injuries in humanized care.

## Methods

Analytical cross-sectional study that included the records of all humanized childbirth care at the OBSNATURA Center in Viña del Mar, Chile, between January 2016 and March 2022 (789 childbirths). OBSNATURA is a health center created by midwives, which was created to provide prenatal education and currently focuses on humanized and multidisciplinary care of natural childbirth, in water, at home and in private health institutions. Term deliveries (37 weeks or more) were included, excluding those in which episiotomy was performed (19 childbirths) and records with incomplete data (55 childbirths). Consequently, 715 deliveries were analyzed.

The response variable was second-degree tears or more during the second stage of labor. A binary indicator was constructed, assigning the value "1" in the case of grade II, III or IV tears, and "0" otherwise (grade I or lesser tears, such as mucosal or labial fissures, haematomas, including undamaged perineum).

To measure childbirth posture, defined as the position chosen by the patient during the second stage of labor (expulsive),<sup>13</sup> a two-level categorical variable was created: (a) vertical or flexible sacral posture, including sedentary positions (in labor chair, on stretcher, on the bed, on the toilet, in a car, in a tub with water), fowler position, standing, leaning or hanging from the neck, kneeling, and four-lying or squatting (on a stretcher, a bed, the floor or in water); b) horizontal or reduced sacral mobility postures, including lithotomy, Mc Robert, supine in bed, lying in bed (stretcher or floor), and right or left lateral decubitus (lateral SIMS).

To reduce possible confounding biases, maternal and newborn variables were included for control or adjustment, including: duration of the second stage of labor (in minutes); use of neuroaxial anesthesia during labor and childbirth; type of delivery (spontaneous or pharmacologically intervened); the newborn's weight (in grams), head circumference (in centimeters) and height (in centimeters); mother's age (in years), number of previous children and occupation (student, technician, professional or housewife).

Descriptive statistics included measures for categorical variables (percentages) and numerical variables (mean and standard deviation). Bivariate association was performed using Pearson's chi-square and Student's t-test. Finally, multivariate analysis was performed by binary logistic regression, reporting crude and adjusted odds ratios (OR) with 95% confidence intervals. All analyses were performed at a significance level of 5% ( $p < 0.05$ ), using STATA 16.0 statistical software.

The research protocol was approved by the Scientific Ethical Committee of the *Universidad Mayor de Santiago*

de Chile (approval act 0253 on May 11, 2022), which granted a waiver of informed consent for the use of clinical records.

## Results

Perineal injuries were present in 64.1% of the women who received humanized childbirth care; however, most

of them corresponded to grade I tears (51.2%). Grade II or greater tears accounted for 12.2%, being mainly type II. The frequency of major tears was very low, with only 0.7% of grade III tears, with no findings of grade IV tears.

The participants' average age was 31±4.8 years, most of whom were professionals or technicians. Humanized care was mainly performed in private clinics. Table 1

**Table 1**

Sociodemographic and clinical characteristics of the study population, according to the presence of type II or more perineal tears. OBSNATURA Center, Viña del Mar - Chile (2016 - 2022).

Variables	General		MV		Perineal Degeneration type II or more				p
	n	%	n	%	Yes		No		
					n	%	n	%	
Childbirth posture			15	2.1					0.02
Vertical	571	79.9			78	13.7	493	86.3	
Horizontal	129	18.0			11	8.5	118	91.5	
Place of delivery			44	6.1					0.69
Home	163	22.8			20	12.3	142	87.7	
Institution	508	71.1			68	13.5	434	86.5	
Age (years)									0.66
[mean (SD)]	31.0	4.8	68	9.5	30.8	4.2	31.1	4.9	
Age – sections			68	9.5					0.06
24 years old or less	62	8.7			9	14.5	53	85.5	
25 – 29 years old	178	24.9			26	14.6	152	85.4	
30 – 34 years old	234	32.7			39	16.7	195	83.3	
35 years old or more	173	24.2			17	18.7	156	25.1	
Occupation			37	5.17					0.06
Student	52	7.3			5	9.6	47	90.4	
Technician	170	23.8			15	8.8	155	91.2	
Professional	389	54.4			64	16.5	325	83.5	
Housewife	67	9.4			5	7.5	62	92.5	
Number of previous children			0	0					0.001
[mean (SD)]	0.7	0.8			0.4	0.5	0.7	0.82	
Parity			0	0					0.001
Nulliparous	357	49.9			62	17.4	295	82.6	
Multiparous	358	50.1			32	8.9	326	91.1	
Expulsion time (min)									0.02
[mean (SD)]	40.1	41.0	28	3.9	49.1	43.4	38.7	40.5	
Neuroaxial anesthesia			23	3.2					0.02
Yes	247	34.5			44	17.8	203	82.2	
No	445	62.2			49	11.0	396	89.0	
Type of delivery			0	0					0.02
Spontaneous VTD	450	63.4			48	10.8	397	89.2	
Interventional* VTD	265	36.6			44	16.8	217	83.1	
NB weight (grams)									0.15
[mean (SD)]	3355	413.7	60	8.4	3399	389.8	3349	417.3	
Cranial circumference NB (cm)									0.16
[mean (SD)]	34.4	1.3	130	18.1	34.5	1.4	34.4	1.3	
NB height (cm)									0.05
[mean (SD)]	49.6	2.1	69	9.6	49.9	1.8	49.6	2.1	

N=715; \*Interventional delivery= pharmacologically induced or conducted; p-value: indicates whether there is statistical significance in Chi-square (categorical variables) or Student's t-tests (numerical variables); MV= missing values; SD= standard deviation; VTD= vertex term delivery; NB= newborn

presents the general description of the study population together with the bivariate analysis between the sociodemographic and clinical variables of the participants and the presence of perineal tear grade II or higher.

Seventy-nine.9% (571) of the deliveries were attended in upright postures. When associating to childbirth posture with the presence of perineal muscle injury, there were significant statistical differences ( $p=0.02$ ) between the proportion of grade II or greater tears in women attended in upright positions (13.7%), in comparison to the horizontal postures (8.5%).

No significant differences were observed between the frequencies of perineal tears type II or more according to the mother's age, occupation or place of delivery (private institution or home). However, all maternal clinical variables were significantly associated with this type of perineal injuries, among them, number of children and parity ( $p<0.01$ ), expulsion time ( $p=0.02$ ), use of neuroaxial anesthesia ( $p=0.02$ ) and type of delivery ( $p=0.02$ ). In relation to the clinical variables of the newborn, significant differences were only present the height in centimeters ( $p=0.05$ ).

From the significant findings of the bivariate analysis, a multivariate analysis was performed by binary logistic regression (Table 2) reporting crude and adjusted odds ratios (OR) and 95% confidence intervals. Vertical postures during the second stage of labor, compared to horizontal postures, after adjusting for maternal and newborn variables, were significantly associated with the presence of perineal tears type II or more, increasing the probability of occurrence of this type of injury (OR=2.31, CI95%=1.11-4.81). In regards to the adjustment variables, nulliparous women had a higher chance of suffering this type of injury compared to women who had at least one child before the present delivery (OR=2.32, CI95%=1.38-3.89). In turn, for each additional centimeter of height of

the newborn, the probability of occurrence of this type of tears increased 2% (OR=1.12, CI95%=1.01-1.28).

## Discussion

The findings of the present study show that vertical posture during the second stage of labor in humanized care, compared to horizontal posture, is significantly associated with the presence of grade II or more tears; however, these injuries have a lower frequency and severity than those reported in deliveries attended under the traditional model.

The overall frequency of perineal injuries was considerably low, being mainly grade I injuries. Muscle injuries (grade II or III tears) represented only 12.9%, with no cases of grade IV tears (rupture of the anal sphincter muscles with tearing of the anal mucosa). Regarding to parity, primiparas presented a higher frequency of injuries (8.6%) than multiparas (4.4%), which is in line with the higher risk reported in that group.<sup>19</sup> Consequently, when comparing our results, we can observe that humanized delivery had a lower prevalence and severity of perineal injuries, which coincides with a decreasing trend reported by recent scientific literature.<sup>20,21</sup>

A study<sup>22</sup> conducted in a maternity hospital in Brazil reported the frequency of perineal injuries in spontaneous vaginal deliveries without episiotomy. The prevalence of grade I tears was 47%, grade II lesions reached 31% and third degree lesions only 1.8%, with no type IV tears. Although the order of the frequencies coincides with the findings of the present study, the magnitude observed in the humanized deliveries analyzed was considerably lower, mainly in grade II and III tears with 12.2% and 0.7%, respectively. Therefore, it can be pointed out that the frequency of tears occurring in humanized deliveries, compared to spontaneous vaginal deliveries attended

**Table 2**

Multivariate model for Perineal Degeneration Grade II and more. OBSNATURA Center, Viña del Mar, Chile (2016 - 2022).						
Variables	Crude OR	95%CI	p	Adjusted OR	CI95%	p
Childbirth Posture			0.133			0.025
Vertical	1.70	0.87; 3.29		2.31	1.11; 4.81	
Horizontal	1.00	-		1.00	-	
Parity			<0.001			0.001
Nulliparous	2.14	1.36; 3.37		2.32	1.38; 3.89	
Multiparous	1.00	-		1.00	-	
Expulsion time (min)	1.00	1.00; 1.01	0.020	1.00	0.99; 1.01	0.186
Use of neuroaxial anesthesia	1.75	1.13; 2.72	0.016	2.27	0.62; 8.25	0.214
Type of delivery			0.022			0.698
Interventional	1.68	1.08; 2.61		0.77	0.21; 2.81	
Spontaneous	1.00	-		1.00	-	
Newborn height (cm)	1.11	0.98; 1.24	0.138	1.12	1.01; 1.28	0.046

Note: Binary logistic regression; OR = Odds ratio; CI95% = 95% confidence intervals.

under the traditional model, is lower and distributed more towards less severe injuries.

Binfa *et al.*<sup>4</sup> studied the frequency of grade III tears in humanized childbirth in Chile, and found a prevalence of 0.7%. In the present study, the frequency of this type of tearing coincided exactly with what was reported. It should be noted that, both in that study and in the present one, no serious injuries (grade IV tears) were recorded, which is a very relevant fact to ratify the importance of humanized care for the prevention of serious pelvic floor dysfunctions in the postpartum period, such as persistent pain,<sup>23</sup> postpartum depression,<sup>24</sup> fecal incontinence,<sup>25</sup> among others.<sup>26</sup>

The available evidence on the relation between birth posture and perineal indemnity is inconclusive. Steen *et al.*,<sup>27</sup> note that lateral (horizontal) position increases rates of intact perineum and that upright, four-lying (not squatting) position reduces the risk of perineal trauma. De Jonge *et al.*<sup>28</sup> on the other hand, describe that grade II perineal tears increase when in a sitting position is adopted, comparing to a reclining position, a finding that coincides with our study where the highest frequency of perineal injuries occurred in upright postures, without breaking down in details whether the upright posture is sitting, upright, kneeling or squatting. Markus *et al.*<sup>29</sup> reinforce the above, indicating that maternal childbirth positions with reduced sacral flexibility significantly decrease the risk of second-degree perineal tearing. These findings coincide with the results obtained in this study, where the risk of type II or greater muscle tearing was significantly higher in women in the vertical delivery position than in those in horizontal positions, after adjusting for maternal and newborn variables.

Regarding adjustment variables, the use of neuroaxial anesthesia was not associated with the presence of grade II or greater perineal tears (OR=2.29, CI95%=0.64-8.14), which is not consistent with other primary and secondary research that has reported that the use of anesthesia is more of a protective factor that tends to decrease perineal tears.<sup>13,25</sup>

Meanwhile, maternal age was not a determining factor for the presence of postpartum perineal dysfunction, which is inconsistent with evidence supporting this direct association.<sup>25,29</sup> Nulliparity was significantly associated with the presence of type II or more perineal tears, which is consistent with other researches.<sup>22,29,30</sup> In our investigation, newborn weight was not associated with the presence of type II or greater tears; however, height showed positive association, which partially coincides with evidence reporting this type of lesions when newborn weight exceeds 4,000 grams.<sup>25,29,31</sup> Although a variable called macrosomia was included in the analysis, there were no significant results to report.

One of the limitations of this study is that the data on perineal injuries correspond to clinical reports, so future research is recommended with other quantitative measurements to objectively compare tissue discontinuity, for example, imaging technologies such as ultrasound.<sup>31</sup> Another limitation is that we do not report the frequency of tearing for each subvariety of, vertical or horizontal posture, so we suggest determining this type of injury separately, especially in squatting position, which has been attributed to a higher risk of pelvic floor injury relative to other standing postures.<sup>27</sup>

Perineal tears could be related to the presence of symptoms of pelviperineal dysfunctions, so we recommend developing longitudinal studies that evaluate the state of pelvic floor functionality in postpartum humanized care and the factors that could influence the occurrence of dysfunctions.

The strengths of this study in contributing to the knowledge on humanized childbirth care, providing valuable information regarding the effect of the postures on the pelvic floor adopted in this type of delivery. On the other hand, the size of the database used, with a large number of clinical records, makes the present investigation one of the largest Chilean studies on humanized multidisciplinary care of natural childbirth.

In conclusion, the findings of the present study show that women in labor attended under the humanized model have a lower frequency and severity of perineal tears compared to those reported at childbirth attended under the traditional model. Vertical positions during the second stage of labor, compared to horizontal positions, are significantly associated with the presence of grade II or higher tears, as are other factors, including nulliparity, length of labor, and size of the newborn.

## Authors' contribution

Cavallari-Drey YE and Ortiz-Llorens M: formulation of the research idea, study design, data collection, and analysis and interpretation of the results. Drafting of the article. The authors have approved the final version of the article and declared they have no conflicts of interest.

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