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ORIGINAL RESEARCH ARTICLE

Comparison of primiparous women's childbirth experience in labor induction with cervical ripening by balloon catheter or oral misoprostol – a prospective study using a validated childbirth experience questionnaire (CEQ) and visual analogue scale (VAS)

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Abstract

Introduction: Primiparity and labor induction, especially when cervical ripening is required, are risk factors for a negative childbirth experience. Our aim was to compare childbirth experience in primiparous women with cervical ripening by balloon catheter or oral misoprostol using the validated Childbirth Experience Questionnaire (CEQ). We also wanted to compare assessment of a negative childbirth experience by visual analogue scale (VAS) and CEQ.

Material and methods: This is a prospective study of 362 primiparous women undergoing cervical ripening and labor induction by balloon catheter (67.4%) or oral misoprostol (32.6%) at Helsinki University Hospital, Finland, between January 1, 2019 and January 31, 2020. After delivery, the women assessed their childbirth experience using the CEQ, and patient records provided the patient characteristics, delivery outcomes and VAS ratings. We analyzed the results using IBM SPSS Statistics.

Results: Overall, the women experienced their labor and delivery rather positively, with a mean CEQ score of 2.9 (SD 0.6) (scale 1–4), and no differences were detectable when comparing women with cervical ripening by balloon catheter or misoprostol. However, women with balloon catheter were more often satisfied with the method chosen for them and would choose the same method in a future pregnancy. Compared with CEQ, VAS seems mainly to reflect the women's perception of their own capacity to give birth and the safety of the hospital setting, not the level of professional support or participation in decision-making. According to our results, CEQ and VAS are comparable, but the usability of the CEQ is limited by its inability to distinguish the most negative and the most positive experiences, and the VAS is limited by its simplicity.

Abbreviations: BC, balloon catheter; CEQ, Childbirth Experience Questionnaire; VAS, Visual Analogue Scale.

Conclusions: Women with cervical ripening by balloon catheter or oral misoprostol experienced their childbirth rather positively, results being similar in both groups. However, women with cervical ripening by balloon catheter were more content with their labor induction. The CEQ and VAS can both be used to assess the childbirth experience of primiparous women undergoing labor induction, but both methods have limitations.

KEYWORDS
balloon catheter, childbirth experience, childbirth experience questionnaire, induction of labor, labor induction, misoprostol, visual analogue scale

1 | INTRODUCTION

Safe labor and delivery, low maternal and neonatal mortality, and morbidity, have for long been the standard in our high-resource maternity care. Today, maternal childbirth experience has become an increasingly important factor in assessment of the care given, emphasizing the active role of the parturient in the process.

Currently, one in three labors is induced.[1] Labor induction, especially when cervical ripening is required, is a known risk factor for a negative childbirth experience and nulliparous women are more at risk than multiparous women.[2–6] As childbirth experience in the first labor has a significant role in family planning,[7] focusing research on this high-risk group of women is of great value. Cervical ripening is initiated either mechanically with a balloon catheter (BC) or pharmacologically with prostaglandins. Both methods are shown to be safe and effective.[8,9]

Childbirth experience can be assessed using interviews or structured questionnaires to ameliorate the care given and to help the women in need to get the support required if the experience has been negative. Two methods most often used in measuring childbirth experience in Finland are the Visual Analogue Scale (VAS) and the multidimensional Childbirth Experience Questionnaire (CEQ).[10] Although VAS and CEQ have previously been studied together in assessing childbirth experience, they have not been compared with each other.[11,12] Our aim was to compare the childbirth experience of primiparous women with cervical ripening and induction of labor by BC or oral misoprostol using CEQ. We also wanted to compare assessment of a negative childbirth experience by VAS and CEQ.

Key message

Women with balloon catheter were more content with their labor induction, but the childbirth experience was similar. VAS and CEQ were in part comparable, but not optimal among women with labor induction.

2 | MATERIAL AND METHODS

This prospective study was carried out between January 1, 2019, and January 31, 2020 at the Department of Obstetrics and Gynecology, Helsinki University Hospital, a tertiary center with 8500 deliveries annually, a labor induction rate of 30%, and a cesarean delivery rate of 23%. We included primiparous women with viable singleton pregnancies undergoing cervical ripening and labor induction by BC or oral misoprostol at or beyond 34 gestational weeks. Figure 1 presents the study design.

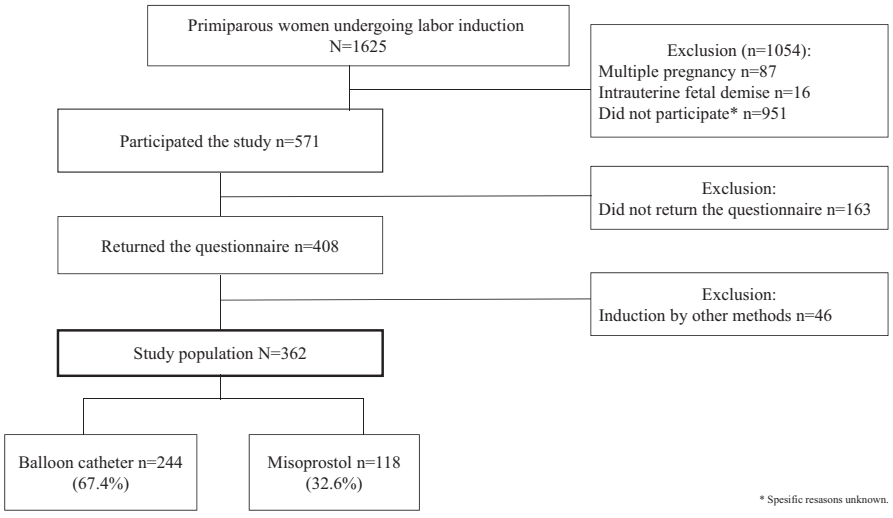

FIGURE 1 Study population.

We collected characteristics and delivery outcomes of the study population from patient records. Maternal characteristics included age, height, body mass index, in vitro fertilization, smoking, pregestational diabetes (types 1 and 2), gestational diabetes, fear of childbirth diagnosed during pregnancy, gestational age at the start of labor induction, Bishop score at the start of labor induction, and indication for labor induction; post-term pregnancy (≥41+0 weeks and no other reason for labor induction), prolonged rupture of membranes (within 12 hours if tested positive for Streptococcus B in admission and 24 hours if tested negative), diabetes (any type), preeclampsia, fear of childbirth or maternal request, non-diabetic macrosomia, intrauterine growth restriction, cholestasis in pregnancy, breech presentation and other (oligohydramnios, fetal heart defect, reduced fetal movements, Rhesus immunization, maternal medical

TABLE 1 Characteristics of the study population ($n = 362$)

	Balloon catheter		Misoprostol		
	$n = 244$	67.4%	$n = 118$	32.6%	*P*-value
Maternal age (mean, SD)	32.7	5.4	33.2	4.8	0.38
Maternal height (median, IQR)	166.7	6.4	167.0	6.8	0.66
Body mass index (median, IQR)	24.0[a]	5.0	25.7	7.7	0.01
In vitro fertilization	24	9.8	9	7.6	0.49
Smoking	14	5.7	9	7.6	0.49
Pregestational diabetes (types 1 and 2)	11	4.5	5	4.2	0.91
Gestational diabetes	61	25.0	36	30.5	0.27
Fear of childbirth diagnosed during pregnancy	17	7.0	8	6.8	0.95
Gestational age at the start of labor induction (median, IQR)	41.0	2.3	40.3	1.9	0.003
Bishop score at the start of labor induction (median, IQR)	4.0	3.0	3.0	2.0	<0.001
Bishop score <3 at the start of labor induction	118	48.4	81	68.6	<0.001
Indication for labor induction					
Post-term pregnancy	111	45.5	26	22.0	<0.001
Prolonged pre-labor rupture of membranes	30	12.3	51	43.2	<0.001
Diabetes	30	12.3	12	10.2	0.55
Preeclampsia	27	11.1	9	7.6	0.31
Fear of childbirth or maternal request	8	3.3	0		
Suspicion of non-diabetic macrosomia	6	2.5	1	0.8	0.44
Intrauterine growth restriction	10	4.1	3	2.5	0.56
Cholestasis in pregnancy	10	4.1	3	2.5	0.56
Breech presentation	0		7	5.9	
Other	12[b]	4.9	6[c]	5.1	0.95

Abbreviations: IQR, interquartile range; SD, standard deviation.

[a]Missing values $n = 1$.

[b]Oligohydramnios $n = 5$, fetal heart defect $n = 3$, reduced fetal movements $n = 1$, Rhesus immunization $n = 1$, maternal medical condition unrelated to pregnancy $n = 1$, drug or alcohol abuse $n = 1$.

[c]Oligohydramnios $n = 2$, fetal heart defect $n = 1$, Rhesus immunization $n = 1$, altering fetal presentation $n = 1$, other unspesified risk in pregnancy $n = 1$.

TABLE 2 Delivery and neonatal outcomes ($n = 362$)

	Balloon catheter		Misoprostol		
	$n = 244$	67.4%	$n = 118$	32.6%	*P*-value
Oxytocin use for labor induction	116	47.7	36	30.5	0.002
Oxytocin use for labor induction or augmentation	222	91.0	105	89.0	0.55
Epidural or spinal analgesia	214[a]	88.1	103[b]	87.3	0.83
Spontaneous vaginal delivery	122	50.0	56	47.5	0.65
Operative vaginal delivery by vacuum extraction	42	17.2	23	19.5	0.60
Cesarean section	80	32.8	39	33.1	0.96
Fetal distress	23	28.7	15	38.5	0.29
Failed induction	29	36.3	11	28.2	0.38
Labor arrest	25	31.3	9	23.1	0.35
Other indication	3[c]	3.8	4[d]	10.3	0.21
Episiotomy	58[e]	24.2	24[f]	20.3	0.44
Delivery complications	80	32.8	37	31.6	0.78
Shoulder dystocia	1	0.4	1	0.8	0.55
Sphincter injury[g]	6	2.5	3	2.5	1.0
Postpartum hemorrhage ≥1000 mL in vaginal delivery	35	21.3	21	26.6	0.36
Uterine rupture	0		0		
Placental retention	5	2.0	2	1.7	1.0
Intrapartum infection	20	8.2	6	5.1	0.28
Postpartum infection	8[h]	3.3	3[i]	2.5	1.0
Induction to delivery interval ≥24 h	161	66.0	96	81.4	0.003
Induction to delivery interval ≥48 h	40	16.4	39	33.1	<0.001
Duration of labor ≥12 h in vaginal delivery	59	36.0	39	49.4	0.05
Neonatal outcomes					
Pre-term (<37 weeks)	6	2.5	4	3.4	0.61
Birthweight [mean (SD)]	3581.4	518.5	3514.8	481.0	0.24
Macrosomia (≥4500 g)	9	3.7	2	1.7	0.30
Apgar 5 min <7	11[j]	4.5	8[k]	6.9	0.36
Umbilical artery pH ≤7.05	3[l]	1.2	2	1.7	0.66
Umbilical artery BE ≤ −12.0	3[l]	1.2	3	2.5	0.40
Neonatal intensive care unit admission	41	16.8	19	16.1	0.87
Infection	7	2.9	0		

Abbreviation: SD: standard deviation.

[a]Missing values $n = 1$.

[b]Missing values $n = 1$.

[c]Of which preeclampsia $n = 1$, infection $n = 1$, hand presentation $n = 1$.

[d]Of which preeclampsia $n = 2$, infection $n = 1$, foot presentation $n = 1$.

[e]Missing values $n = 4$.

[f]Missing values $n = 1$.

[g]Of which all III degree tears.

[h]Of which endometritis $n = 4$ and episiotomy wound infection $n = 4$.

[i]Of which endometritis $n = 1$ and cesarean section wound infection $n = 2$.

[j]Missing values $n = 4$.

[k]Missing values $n = 2$.

[l]Missing values $n = 1$.

condition unrelated to pregnancy, drug or alcohol abuse, altering fetal presentation, and other unspecified risk in pregnancy). Delivery outcomes included oxytocin use for labor induction and augmentation, epidural and spinal analgesia, mode of delivery (spontaneous vaginal, operative vaginal by vacuum extraction, and cesarean section), indication of cesarean section (fetal distress, failed induction, labor arrest, and other such as preeclampsia, infection and hand/foot presentation), episiotomy, delivery complications (shoulder dystocia, sphincter injury, postpartum hemorrhage ≥1000 ml in vaginal delivery, uterine rupture, placental retention, intrapartum and postpartum infection) induction to delivery interval, and duration of labor in vaginal delivery. Neonatal outcomes included preterm (<37 weeks), birthweight, macrosomia (≥4500 g), Apgar at 5 minutes <7, umbilical artery pH ≤7.05, umbilical artery BE ≤ −12.0, neonatal intensive care unit admission and infection.

We used the multidimensional CEQ as the childbirth experience survey method.[13] Participants received the questionnaire upon admission to the labor induction unit and returned it within 1 month from childbirth by mail or email. The CEQ was available in Finnish, Swedish and English. The questionnaire has been validated in all languages used in this study[10,13,14] and all participating women had sufficient understanding on one of these languages.

The 22 items on the questionnaire are grouped into four domains: "Own capacity", "Professional support", "Perceived safety" and "Participation". Of the items, 19 are scored on a four-point Likert scale (totally agree = 4, mostly agree = 3, mostly disagree = 2, totally disagree = 1). Three items are assessed with a VAS scale and the VAS scale scores are changed to categorical values: 0–40 = 1, 41–60 = 2, 61–80 = 3 and 81–100 = 4. Negatively worded items as well as the question on labor pain are reversed so that higher scoring reflects a more positive experience. Domain scores are computed as means of individual scores within the domain. The total score is computed similarly.

With permission of the authors of the original CEQ, we added a non-validated "Induction" domain to the questionnaire by adding six items on labor induction to the CEQ. This domain is not included in analyses of total CEQ scores. One item on timing of labor induction was set on a three-point Likert scale (earlier, later, content with timing) and five items were scored in a four-point Likert scale (totally agree = 4, mostly agree = 3, mostly disagree = 2, totally disagree = 1).

To assess the questionnaire's ability to distinguish a negative or positive childbirth experience in our study population, we examined the floor and ceiling effects, percentages of given scores in the lowest and highest ends of the scale. Percentages >15 indicate unsuitability, as many are unable to score low or high enough.[15]

As standard practice at our hospital, all women rate their overall experience of labor and delivery on a VAS prior to discharge from the postpartum unit, with zero representing the most negative experience possible and 10 representing the most positive experience possible.[2] At our hospital, a VAS score ≤4 represents a negative childbirth experience, and these women may receive additional support after discharge. In the CEQ, we defined the childbirth experience as negative if the woman had all her domain scores in the most negative quartile of scores given.

The primary outcome of the study was childbirth experience measured by CEQ. We analyzed the women as separate cohorts according to the primary method of cervical ripening, BC or oral misoprostol. The secondary outcome was comparability of the results of negative childbirth experience detected by VAS and CEQ. We made no sample size calculations prior to commencing the study, as we planned this to be a 1-year cohort study.

Preferences of the treating obstetrician and the patient determined the method of cervical ripening; either a single 40–80 mL BC (Rüsch two-way Foley Couvelaire tip catheter size 22 Ch, Teleflex Medical) for a maximum of 24 hours at a time, or misoprostol 50 μg (orally every 4 hours, no more than six doses in 24 hours) (Cytotec®, Piramal Healthcare UK Limited). When the cervix reached Bishop score of ≥6, amniotomy in the case of intact membranes, and intravenous oxytocin infusion in the absence of regular contractions followed. If the labor did not start after ruptured membranes and 12–18 hours of oxytocin infusion,[16] the diagnosis was a failed labor induction. Regular contractions and cervical dilation of ≥6 cm defined labor onset.[17] If there was no progress with cervical dilation of ≥6 cm, adequate contractions for ≥4 hours and ruptured membranes, or if delivery failed at full cervical dilation and ≥1 hour of active pushing or by failed operative vaginal delivery, the diagnosis was labor arrest.[18] Our clinic routinely uses continuous cardiotocography during labor.

2.1 | Statistical analyses

We performed analyses using IBM SPSS Statistics for Windows, Version 27.0. To compare categorical variables, we used the Chi-square test and Fisher's exact test, when appropriate, and present the data in numbers and percentages. We analyzed data with continuous variables by *t*-test when the data were normally distributed and by Mann–Whitney *U*-test when they were not, and present these data using means or medians and standard deviations (SD) or interquartile ranges (IQR) according to distribution type. We considered a *P*-value <0.05 statistically significant. Multivariable analysis for possible confounding factors for negative childbirth experience was not feasible due to sample size.

2.2 | Ethics statement

The institutional review board of the hospital region approved the study (Helsinki and Uusimaa Hospital District Committee for Obstetrics and Gynecology, no. HUS/3172/2018 on December 5, 2018, and HUS/154/2019 on March 11, 2019). All participating women gave written informed consent after receiving written and oral information on the study.

3 | RESULTS

A total of 571 primiparous women participated, of which 408 returned the CEQ (response rate 71.5%) and 362 met the study criteria (Figure 1). Of the women, 244 (67.4%) underwent cervical ripening by BC and 118 (32.6%) by misoprostol. Table 1 presents characteristics of the study population. The women with labor induction by BC were leaner, of more advanced gestational age, and had a riper cervix prior to labor induction. The women with induction by misoprostol more often had pre-labor rupture of membranes (Table 1).

Table 2 presents delivery and neonatal outcomes. Oxytocin use in labor induction was more common in women with cervical ripening initiated by BC compared with misoprostol (Table 2). However, oxytocin use in general, labor augmentation included, was as common in both groups of women. The median induction to delivery interval was shorter in women with induction by BC than in women with induction by misoprostol (31.4 [IQR 21.6] hours vs 36.9 [IQR 27.6] hours, $P < 0.001$), and more women with BC had a vaginal delivery within 24 hours from the start of induction (72 [29.5%] vs 16 [13.6%], $P < 0.001$).

The mean total CEQ score for all women was 2.9 (SD 0.6). In "Own capacity it was 2.4 (SD 0.6), in "Professional support" it was 3.7 (SD 0.5), in "Perceived safety" it was 2.9 (SD 0.7), and in "Participation" it was 3.2 (SD 0.8). When comparing women according to the method of cervical ripening, no differences were detectable (Table 3).

Table 4 presents scores of the individual items of the CEQ according to method of cervical ripening, with similar results in both groups. Table 4 also presents floor and ceiling effects. In women with BC, a floor effect, >15% of scores in the most negative alternative, was observable in 36.4% (8 of 22) of the items and in women with misoprostol, in 40.9% (9 of 22) of the items. A ceiling effect, >15% of scores in the most positive alternative, was observable in 63.6% (14 of 22) and 72.7% (16 of 22) of the items, respectively.

In the unvalidated part of the questionnaire on labor induction, 77.9% of the women were content with the timing of induction (78.3% of women with BC and 77.1% of women with misoprostol, $P = 0.80$). When the remaining five items on labor induction were grouped together as an unvalidated "Induction" domain, the mean score for women with BC was 3.6 (SD 0.6) and for women with misoprostol, 3.2 (SD 0.6), $P < 0.001$. Women with BC were more often satisfied with the labor induction method chosen for them and would select the same method in a next pregnancy than would women with misoprostol. In the "Induction" domain, a ceiling effect was detectable in all items, and a floor effect was detectable in one item in the misoprostol group (Table 5).

In our study, 5.8% (21 of 362) of the women had a negative childbirth experience in CEQ (5.3% [13 of 244] of women with BC and 6.8% [8 of 118] of women with misoprostol, $P = 0.58$). When using VAS score 0–4, 10.5% (38 of 362) of the women had a negative childbirth experience (11.1% [27 of 244] of women with BC and 9.3% [11 of 118 of women with misoprostol, $P = 0.59$]).

Table 6 shows the comparison of VAS and CEQ. Women with VAS 0–4, compared with women with VAS 5–10, more often had a negative childbirth experience in CEQ as a whole and in the individual domains "Own capacity", "Professional support" and "Perceived safety". In the "Participation" domain, a negative childbirth experience was as common in both VAS 0–4 and VAS 5–10 groups.

4 | DISCUSSION

In this study of primiparous women undergoing cervical ripening and labor induction, the childbirth experience measured by CEQ was 2.9 on the scale of 1–4, reflecting a rather positive experience. No differences in CEQ scores were detectable when comparing BC and misoprostol as a method of cervical ripening, but the women with BC were more content with their labor induction.

Our results of similar childbirth experiences in women with cervical ripening by BC or misoprostol are comparable to those of the Swedish study of multiparous and primiparous women undergoing labor induction for prolonged pregnancy (≥41+0 weeks), in which no differences in CEQ scores were found between the two methods.[11] In contrast, our results of women's preference for BC are in disagreement with two earlier studies, where women preferred misoprostol over BC in a future pregnancy.[9,19] In our study, the labor induction to delivery interval was shorter in women with labor induction by BC, possibly due to higher Bishop score at the start of labor induction, which may be one reason why this method was favored. Also, in our hospital, women with BC usually have the possibility of outpatient cervical ripening, being instructed to return to the hospital at BC

TABLE 3 Childbirth Experience Questionnaire (CEQ) domain scores ($n = 362$)

	Balloon catheter				Misoprostol					
	Mean	Median	SD	IQR	Mean	Median	SD	IQR	*P*-value	Data distribution
Own capacity	2.3	2.4	0.6	0.8	2.4	2.4	0.6	0.8	0.90	normal
Professional support	3.7	4.0	0.4	0.4	3.7	3.9	0.5	0.4	0.49	skewed
Perceived safety	2.9	3.0	0.7	1.0	2.9	3.0	0.7	1.2	0.99	normal
Participation	3.2	3.3	0.7	1.3	3.1	3.3	0.8	1.3	0.26	normal
Total CEQ score	2.9	3.0	0.5	0.7	2.9	3.0	0.5	0.8	0.57	normal
Numbers of items replied	21.8	22.0	1.2	0	21.7	22.0	1.4	0	0.81	skewed

Abbreviations: IQR, interquartile range; SD, standard deviation.

TABLE 4 Childbirth Experience Questionnaire (CEQ) item description ($n = 362$)

	Total sample per item $n = 244$	Floor % (most negative)	Ceiling % (most positive)	Mean	Median	SD	IQR	Total sample per item $n = 118$	Floor % (most negative)	Ceiling % (most positive)	Mean	Median	SD	IQR	*P*-value
Own capacity															
Labor and birth went as I had expected	244	22.5	13.1	2.4	2.0	1.0	1	117	25.6	10.3	2.3	2.0	1.0	2	0.36
I felt strong during labor and birth	244	15.2	14.8	2.6	3.0	0.9	1	117	16.2	17.9	2.6	3.0	1.0	1	0.69
I felt capable during labor and birth	243	12.3	9.9	2.6	3.0	0.8	1	118	8.5	14.4	2.7	3.0	0.8	1	0.14
I was tired during labor and birth	243	44.4	6.2	1.8	2.0	0.9	1	117	52.1	6.0	1.7	1.0	0.9	1	0.14
I felt happy during labor and birth	244	13.5	9.8	2.5	3.0	0.8	1	118	9.3	11.0	2.6	3.0	0.8	1	0.10
I felt that I handled the situation well (visual analogue scale, VAS)	239	1.3	44.4	3.3	3.0	0.7	1	118	1.7	39.8	3.2	3.0	0.8	1	0.39
As a whole, how painful did you feel your childbirth was? (VAS)	241	29.5	7.5	2.0	2.0	0.9	1	116	31.9	10.3	2.0	2.0	0.9	1	0.80
As a whole, how much control did you feel you had during childbirth? (VAS)	240	52.1	4.6	1.7	1.0	0.9	1	117	53.8	5.1	1.7	1.0	0.9	1	0.71
Professional support															
My midwife devoted enough time to me	241	0.4	79.7	3.8	4.0	0.5	0	118	1.7	77.1	3.7	4.0	0.6	0	0.53
My midwife devoted enough time to my partner	239	1.3	71.5	3.6	4.0	0.6	1	115	1.7	73.9	3.7	4.0	0.6	1	0.55
My midwife kept me informed about what was happening during labor and birth	242	1.2	74.0	3.7	4.0	0.6	1	116	0.9	65.5	3.6	4.0	0.6	1	0.10
My midwife understood my needs	243	0.8	71.2	3.7	4.0	0.6	1	117	1.7	67.5	3.6	4.0	0.7	1	0.37
I felt very well cared for by my midwife	243	1.2	84.4	3.7	4.0	0.6	1	116	0.9	79.3	3.8	4.0	0.5	0	0.22
Perceived safety															
I felt scared during labor and birth	244	18.9	20.9	2.5	2.0	1.0	1	118	16.1	20.3	2.6	2.0	1.0	1	0.56
I have many positive memories from childbirth	243	12.3	16.9	2.7	3.0	0.9	1	118	11.0	24.6	2.8	3.0	0.9	1	0.22
I have many negative memories from childbirth	244	16.8	14.3	2.5	2.0	0.9	1	118	19.5	16.9	2.5	3.0	1.0	1	0.85
Some of my memories from childbirth make me feel depressed	244	12.7	41.8	2.9	3.0	1.1	2	118	16.1	38.1	2.8	3.0	1.1	2	0.34
My impression of the team's medical skills made me feel secure	243	1.6	72.8	3.7	4.0	0.6	1	118	3.4	72.0	3.6	4.0	0.7	1	0.70

(Continues)

TABLE 4 (Continued)

	Total sample per item *n* = 244	Floor % (most negative)	Ceiling % (most positive)	Mean	Median	SD	IQR	Total sample per item *n* = 118	Floor % (most negative)	Ceiling % (most positive)	Mean	Median	SD	IQR	*P*-value
As a whole, how secure did you feel during childbirth?	241	7.5	48.5	3.2	3.0	0.9	1	116	12.1	52.6	3.2	4.0	1.1	1	0.75
Participation															
I felt I could have a say whether I could be up and about or lie down	243	7.0	57.6	3.3	4.0	0.9	1	117	7.7	49.6	3.2	3.0	0.9	1	0.21
I felt I could have a say in deciding my birthing position	236	18.2	41.1	2.9	3.0	1.1	2	115	16.5	37.4	2.8	3.0	1.1	2	0.42
I felt I could have a say in the choice of pain relief	243	2.1	54.7	3.4	4.0	0.7	1	118	5.1	61.0	3.4	4.0	0.9	1	0.87

Note: Both mean and median numbers shown, since some variables are distributed normally and some are not.

Abbreviations: IQR, interquartile range; SD, standard deviation.

expulsion or latest after 24 hours from insertion. This may influence the experience positively, since misoprostol induction takes place at the hospital, and outpatient induction by BC has previously been found to be preferred by women compared with inpatient induction by dinoprostone.[20]

When comparing VAS and CEQ, they were best comparable in the domains "Own capacity" and "Perceived safety". In women with VAS 0–4, seven and eight women in 10, respectively, had a negative childbirth experience in these domains of the CEQ. On the contrast, in "Professional support" and "Participation", only five and two women in 10 women, respectively, with VAS 0–4 had a negative childbirth experience in these domains of the CEQ. According to these findings, VAS seems mostly to reflect the women's perception of their own capacity to give birth and the safety of the setting, not the level of professional support or possibility to be an active participant and decision-maker in their own labor and birth.

In our study, 5.8% of the women had a negative childbirth experience as assessed with CEQ and 10.5% of women as assessed with VAS. Thus, using VAS 0–4 as the criterion instead of a negative experience in CEQ provides more women with additional support postpartum. Interestingly, though, one in four women whose VAS 5–10 had a negative experience in at least one CEQ domain. The "too high" VAS could partly be related to survey timing a day or two after delivery in the postpartum ward, where women often feel relieved after the labor regardless of possible hardships along the way. Also, the presence of a midwife may influence the scoring. In this study, the women filled the CEQ in privacy and returned it within 1 month from delivery, allowing them to assess the experience thoroughly.

A previous study on the timing of CEQ showed that when the questionnaire was answered during the first week postpartum and 3 months later, the domain scores of "Professional support" and "Participation" decreased over time, but not the total CEQ score or the domains "Own capacity" and "Perceived safety",[21] the two domains comparable to VAS. Hence, the simple numerical VAS score of the first days postpartum seems a useful substitute for a more lengthy CEQ a month later – bearing in mind that it seems to reflect the childbirth experience less fully.

The strengths of this study are the relatively large sample size, the uniform labor induction and labor management practices in our hospital, and the meticulous data gathering in our electronical patient databases. The potential weaknesses of this study include the possible selection bias in the choice of method for cervical ripening, since we did not randomize women to receive either a BC or oral misoprostol. Also, not all women undergoing labor induction participated the study, and not all women recruited answered the questionnaire, both of which could lead to bias. The choice of questionnaire, too, appears a weakness, since the CEQ, originally validated in primiparous women with spontaneous onset of labor, showed notable floor and ceiling effects, reflecting the difficulty of distinguishing the most negative and the most positive childbirth experiences in women whose labor is induced. Thus, the CEQ may not be the best tool to evaluate the childbirth experience of women with labor induction. Perhaps the new version of the questionnaire, the CEQ2, is better.[22] The added items

TABLE 5 Unvalidated Induction domain item description ($n = 362$)

	Balloon catheter							Misoprostol						
	Total sample per item $n = 244$	Floor % (most negative)	Ceiling % (most positive)	Mean	Median	SD	IQR	Total sample per item $n = 118$	Floor % (most negative)	Ceiling % (most positive)	Mean	Median	SD	IQR	*P*-value
I am satisfied with the labor induction method chosen for me	241	1.7	63.5	3.5	4.0	0.7	1	117	3.4	42.7	3.2	3.0	0.8	1	<0.001
I would select the same labor induction method again in next pregnancy	241	6.2	48.1	3.3	3.0	0.9	1	116	15.5	20.7	2.7	3.0	1.0	1	<0.001
The information I received about labor induction was clear and sufficient	241	4.6	58.9	3.4	4.0	0.8	1	117	4.3	49.6	3.3	3.0	0.8	1	0.10
I was happy with the staff of the labor induction unit	242	1.2	73.6	3.7	4.0	0.6	1	117	3.4	66.7	3.6	4.0	0.7	1	0.15
I was satisfied with the pain relief I received in the labor induction unit	241	7.5	47.3	3.2	3.0	0.9	1	115	12.2	45.2	3.0	3.0	1.1	2	0.17

Note: Both mean and median numbers showed since some variables are distributed normally and some are not.
Abbreviations: IQR, interquartile range; SD, standard deviation.

TABLE 6 Comparison of Visual Analog Scale (VAS) and Childbirth Experience Questionnaire (CEQ) domains when used to detect a negative childbirth experience ($n = 362$)

	VAS 0–4 ($n = 38$)		VAS 5–10 ($n = 324$)		
	n	%	*n*	%	*P*-value
Negative Own capacity ($n = 112$)	28	73.7	80	25.9	<0.001
Negative Professional support ($n = 113$)	18	47.4	90	29.1	0.02
Negative Perceived safety ($n = 115$)	32	84.2	77	24.9	<0.001
Negative Participation[a] ($n = 100$)	9	23.7	86	27.9	0.581
Negative score in all domains ($n = 21$)	5	13.2	14	4.5	0.03

Note: Domain score defined as negative when the woman had her score in the most negative quartile of scores given in the study. *P*-value is determined by Chi-square test by comparing the women with VAS 0–4 to women with VAS 5–10.

[a]Missing data $n = 1$.

on labor induction in this study are also not useful in the future due to an extreme ceiling effect. We regret that the sample size did not allow for a multivariable model assessment for a more thorough evaluation of factors affecting a negative result. As the rates of many known risk factors for a negative childbirth experience (operative delivery [cesarean section, vacuum extraction, forceps], long labor (≥12 hours), oxytocin use, maternal complications, hemorrhage and neonatal complications such as admission to intensive care unit)[2,3,5,10,13,14,23,24] were similar between the groups of women with cervical ripening by BC or by misoprostol, we believe the groups are comparable regarding these possible confounding factors, even though a multivariable analysis was not feasible in this study.

5 | CONCLUSION

Women with cervical ripening by BC or oral misoprostol experienced their childbirth rather positively, and the results were similar in both groups. However, women with cervical ripening by BC were more often satisfied with the method chosen for them and would more often choose the same method in a future pregnancy than would women with cervical ripening by misoprostol. The CEQ and VAS are in part comparable, but VAS seems to mainly reflect the women's perception of their own capacity to give birth and the safety of the hospital setting, not the level of professional support or participation in decision-making.

AUTHOR CONTRIBUTIONS

HK and LR designed and organized the study. KP analyzed the data and wrote the original manuscript draft. All authors participated in revising the manuscript and agreed on the final version.

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CONFLICT OF INTEREST

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

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