Randomized Controlled Trial of Hands-and-Knees Positioning for Occipitoposterior Position in Labor

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ABSTRACT: Background: *Hands-and-knees positioning during labor has been recommended on the theory that gravity and buoyancy may promote fetal head rotation to the anterior position and reduce persistent back pain. A Cochrane review found insufficient evidence to support the effectiveness of this intervention during labor. The purpose of this study was to evaluate the effect of maternal hands-and-knees positioning on fetal head rotation from occipitoposterior to occipitoanterior position, persistent back pain, and other perinatal outcomes.* **Methods:** *Thirteen labor units in university-affiliated hospitals participated in this multicenter randomized, controlled trial. Study participants were 147 women laboring with a fetus at ≥37 weeks' gestation and confirmed by ultrasound to be in occipitoposterior position. Seventy women were randomized to the intervention group (hands-and-knees positioning for at least 30 minutes over a 1-hour period during labor) and 77 to the control group (no hands-and-knees positioning). The primary outcome was occipitoanterior position determined by ultrasound following the 1-hour study period and the secondary outcome was persistent back pain. Other outcomes included operative delivery, fetal head position at delivery, perineal trauma, Apgar scores, length of labor, and women's views with respect to positioning.* **Results:** *Women randomized to the intervention group had significant reductions in persistent back pain. Eleven women (16%) allocated to use hands-and-knees positioning had fetal heads in occipitoanterior position following the 1-hour study period compared with 5 (7%) in the control group (relative risk 2.4; 95% CI 0.88–6.62; number needed to treat 11). Trends toward benefit for the intervention group were seen for several other outcomes, including operative delivery, fetal head position at delivery, 1-minute Apgar scores, and time to delivery.* **Conclusions:** *Maternal hands-and-knees positioning during labor with a fetus in occipitoposterior position reduces persistent back pain and is acceptable to laboring women. Given this evidence, hands-and-knees positioning should be offered to women laboring with a fetus in occipitoposterior position in the first stage of labor to reduce persistent back pain. Although this study demonstrates trends toward improved birth outcomes, further trials are needed to determine if hands-and-knees positioning promotes fetal head rotation to occipitoanterior and reduces operative delivery. (BIRTH 32:4 December 2005)*

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Occipitoposterior position of the fetal head during labor is associated with increased incidence of operative delivery, maternal and neonatal morbidity, and prolonged labor, as well as unremitting back pain (1–4). Approximately 5 percent of babies are delivered in occipitoposterior position, whereas estimates of the incidence of occipitoposterior position during labor range from 15 to 34 percent (5,6).

No effective interventions to facilitate fetal head rotation during labor are known. However, some caregivers recommend the hands-and-knees position, on the theory that gravity and buoyancy may promote fetal head rotation (7–10). Two randomized controlled trials have examined the effect of hands-and-knees positioning at >37 weeks' gestation before the onset of labor. Although one study found that hands-and-knees positioning promoted fetal head rotation from occipitoposterior to occipitoanterior position (7), it employed an unreliable method of determining fetal head position (manual palpation). In a more recent trial (n = 2,547), antenatal hands-and-knees positioning did not reduce the incidence of occipitoposterior position at birth (11).

We found no trials in which the intervention occurred during labor, however, and none that addressed the question of whether the position will alleviate associated back pain. Hands-and-knees positioning could be more effective during labor than antenatally; forces of labor might aid in rotation and if rotation occurred, the short time to delivery might ensure the change to an anterior position was a permanent one.

Hands-and-knees position is a simple intervention with the potential for preventing complications that necessitate medical interventions such as amniotomy, oxytocics, and operative delivery, and their subsequent maternal and neonatal risks. We investigated the effect of maternal hands-and-knees positioning during labor on fetal head rotation from an occipitoposterior to an occipitoanterior position, persistent back pain, and other maternal and infant outcomes.

Methods

Protocol

During a 28-month period in 2000–2002, 13 university-affiliated hospitals in Argentina, Australia, Canada, England, Israel, and the United States participated in the study. Research ethics board approval was obtained for all participating centers. Eligible women were identified based on the occurrence of one or more of the following clinical signs and symptoms thought to indicate labor with a malpositioned fetus: persistent back pain; slower than normal progress; vaginal examination, recent ultrasound, Leopold's maneuvers or abdominal contours suggesting occipitoposterior position; irregular contraction pattern; urge to push before full dilatation; suprapubic pain; fetal heart rate located at the maternal flank; or edematous cervix. Eligible women were also required to be in hospital, in early or active labor with a singleton pregnancy in cephalic presentation at $\geq$ 37 weeks' gestation, with occipitoposterior position of the fetal head confirmed by ultrasound examination.

Women were excluded from participation if second stage of labor was expected within 1 hour, complications of pregnancy or any other contraindication to assuming hands-and-knees position (such as immobilizing anesthesia) occurred, cesarean delivery was planned, or known major fetal congenital anomalies were present. The nurse or midwife caring for the laboring woman assessed patient eligibility. Only after informed consent was given were baseline data collected and an ultrasound examination performed with a portable ultrasound unit.

If ultrasound revealed the fetus was not in occipitoposterior position, baseline data were collected but the woman was not randomized. If ultrasound confirmed occipitoposterior position, the laboring woman was asked to complete the Short Form McGill Pain Questionnaire (SF-MPQ) and then she was randomized.

Assignment

The randomization scheme included prognostic stratification for parity (nullipara or multipara) and anesthesia use (epidural or no epidural), incorporated random block sizes of 4 and 6, and was centrally controlled with the use of a telephone-based, computerized, randomization system. After the caller entered baseline data, group assignment was delivered by computerized voice message, and was automatically recorded along with baseline information in a separate database table.

Masking

Because of the nature of the intervention, participants and caregivers could not be blinded. Clinicians who placed the telephone call to obtain group allocation were not permitted to perform the final ultrasound scan to determine the primary outcome. Nurses, midwives, and laboring women were instructed not to reveal group assignments to the clinician performing the final ultrasound examination, and clinicians were asked not to seek out the

laboring woman's assignment. Although the clinician may also have provided care to the laboring woman, it was rare that the woman needed to be assessed during the short interval between ultrasound scans. Forms were sealed so that the clinician recording the ultrasound results was unable to access data sheets indicating the woman's group assignment and pain scores. Research assistants collecting data from chart review and scanning data into the computer database were unaware of group allocation.

Intervention

Centers were provided with laminated cards with a woman depicted in hands-and-knees position; these were taken into the labor room to help women understand the position they were to assume. After randomization to the intervention group, the nurse or midwife assisted the woman in achieving the hands-and-knees position.

Women assigned to the intervention group were asked to maintain the hands-and-knees position for as much time as possible over a period of 60 minutes, for a minimum of 30 minutes in total. The time spent in this position during the study period was recorded on the trial data forms by the nurse, midwife, or labor partner. After the study period, the woman was encouraged to use the hands-and-knees position whenever she wished for the remainder of labor.

Women assigned to the control group were able to use any position except hands-and-knees position or any position that suspended the maternal abdomen. Women in the control group were asked not to assume hands-and-knees position at any time during the study period and were not actively encouraged to use this position at any other time in labor. At the end of the hour, both groups completed a second pain rating using the SF-MPQ, followed by the final ultrasound examination.

Primary Outcome: Fetal Head Rotation

Clinicians who were to perform ultrasound determination of fetal head position were informed about the study definitions of occipitoanterior, occipitoposterior, and occipitotransverse positions by means of written materials (12), and demonstrated their ultrasound assessment skills during site visits by the principal investigator. Remote centers that could not be visited provided paper printouts of ultrasound scanning for verification of assessment skills. If fetal head position could not be determined at the initial ultrasound, the scan was repeated by another experienced clinician or the woman was not randomized. Similarly, if fetal head position could not be determined at the final ultrasound, the scan was repeated by another experienced clinician. If a woman delivered precipitously or by emergency cesarean section, and was unable to have the final intrapartum ultrasound to determine fetal head position after the intervention, the fetal head position at delivery (before any rotational intervention) was used instead.

Secondary Outcome: Persistent Back Pain

Women were asked to answer the SF-MPQ referring specifically to their persistent back pain, defined as pain, located in the back, which does not resolve, and is distinct from the pain of contractions. The SF-MPQ has 3 components including 11 sensory and 4 affective word descriptors rated on a 4-point intensity scale (score range 0–45), the Present Pain Intensity Index (PPI) (score range 0–5), and the Visual Analogue Scale (VAS) (score range 0–10). The SF-MPQ has demonstrated validity and clinical utility for women experiencing labor pain, and is sensitive to clinical interventions for pain relief (13–15). The centers in Israel and Argentina used translated versions of the data forms; all forms were back-translated to verify their accuracy.

Other Outcomes

Participants were asked to complete a questionnaire before hospital discharge to verify compliance with the assigned group and determine maternal evaluations of positions used. The questionnaire also contained the Labor Agentry Scale (16), a unifactorial, 10-item, Likert-type rating scale that has been used in many studies of women's experiences of personal control during labor and birth. Cronbach's alpha reliability coefficient for the Labor Agentry Scale has consistently been shown to be > 0.88. Information on other labor and delivery outcomes was extracted from participants' medical records.

Sample Size

Although many occipitoposterior positions rotate spontaneously to the ideal occipitoanterior position, they do so over what is usually several hours between the onset of labor and the end of the second stage. For the purpose of calculating the sample size, the generous assumption was made that 25 percent of the control group would rotate from occipitoposterior position to occipitoanterior position in the relatively short time between the first and second ultrasound

examinations. The sample size was based on the ability to detect a moderate increase of 25 percentage points to a rate of 50 percent occipitoanterior position in the intervention group. The total required sample size for a two-sided, 5 percent level test of hypothesis with 80 percent power was 128; to account for losses to follow-up, we aimed to randomize 146 women.

Statistical Analysis

Data were scanned directly into the study database using TELE*form* software (17) and analyzed using SAS version 8.2 (18). In keeping with the "intention-to-treat" approach, all participants were included in the final analysis. Demographic, maternal satisfaction and preference variables, and baseline variables were analyzed and compared using descriptive statistics. A two-sided significance level of 0.05 was used for the primary and secondary questions, whereas a significance level of 0.005 (two-sided) was used for the other comparisons, to account for multiple comparisons.

Dichotomous variables, such as the primary outcome, fetal head position, were analyzed using a contingency table chi-square or Fisher exact test if cell counts were small, and were presented as relative risks with 95 percent confidence intervals when appropriate. Persistent back pain scores were analyzed using a two-sample t test of the differences between pretest and posttest. Other continuous variables, such as Labor Agentry Scale scores, also were analyzed using unpaired 2-sample t tests.

Results

Participant Recruitment and Flow

Although originally planned for only a few local centers, recruitment to the trial was slow and required the addition of other sites. Many participating centers reported that assessment of fetal head position in early labor was not routine practice, making it difficult for clinicians to identify eligible women in time to enroll them. Screening for occipitoposterior position based on clinical symptoms was also less effective than anticipated, further slowing the rate of recruitment. Some centers were able to overcome these challenges and others struggled with them. Six centers contributed 10 or more participants to the study (range 10–39), and 7 centers contributed fewer than 10 participants each (range 1–9).

Figure 1 shows the flow of participants through the trial. Of the 208 women enrolled in the study, ultrasound examination revealed that 150 (72%) were laboring with a fetus in occipitoposterior position. The 58 women with a baby in a position other than occipitoposterior were not randomized; this group was similar to the randomized groups on baseline and demographic variables. Three women with confirmed occipitoposterior position were not randomized due to logistical reasons, leaving 147 in the final sample, of whom 70 were assigned to the intervention group and 77 to the control group. The intervention and control groups were similar on baseline and demographic variables (Table 1).

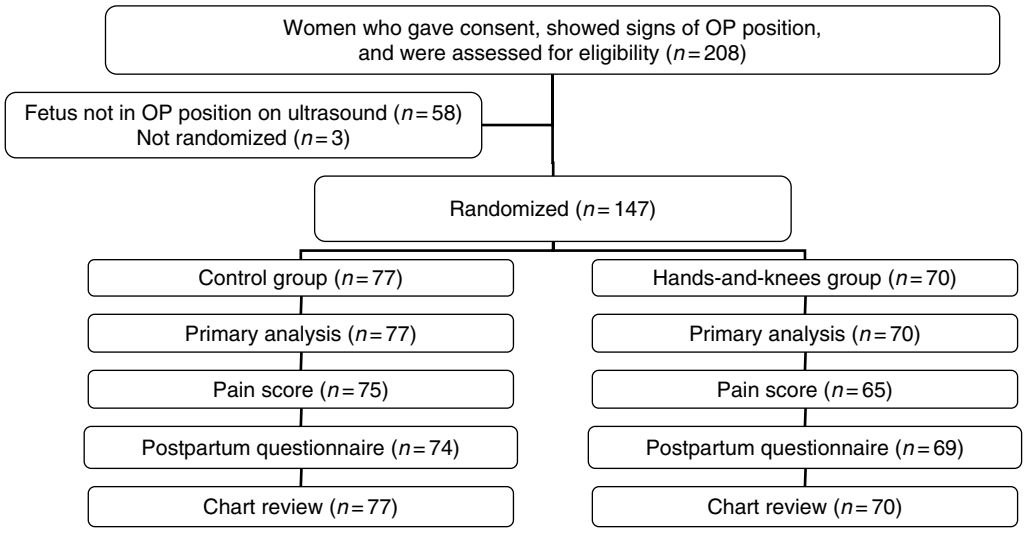

Fig. 1. Flow of participants through the various stages of the trial (OP = occipitoposterior).

Primary Outcome: Fetal Head Rotation

Eleven women (16%) allocated to use hands-and-knees positioning had fetal heads in occipitoanterior position after the 1-hour study period compared with 5 (7%) in the control group (RR 2.42; 95% CI 0.88–6.62; number needed to treat 11) (Table 2).

Secondary Outcome: Persistent Back Pain

Using the differences in pre-intervention and post-intervention persistent back pain scores, statistically significant differences between the 2 groups were identified on all 3 components of the SF-MPQ; persistent back pain scores were significantly reduced for women in the intervention group (Table 3).

Other Outcomes

No statistically significant differences were found between study groups on the other outcomes (Table 2). However, there was a consistent pattern of trends favoring the intervention group for operative delivery, fetal head position at delivery, 1-minute Apgar score, and time from randomization to delivery. The groups were similar with respect to labor and birth events occurring after randomization (Table 4).

Adherence to, and Acceptability of, the Intervention

Adherence to the trial protocol was good; 69 of 70 women assigned to the intervention group used hands-and-knees positioning, whereas only 3 of 77 women assigned to the control group used this position during the study period. In the intervention group, most women (n = 59, 84%) spent at least 30 minutes in hands-and-knees position during the study period. In only one case did fetal distress prevent the woman from achieving 30 minutes in hands-and-knees position; fetal distress resolved after discontinuing the position. No other cases showed adverse events.

Of the 67 women in the intervention group who responded to the question in the postpartum questionnaire, 21 (31%) used hands-and-knees position after the study period. Of the 70 women in the control group who responded to the question, 14 (20%) used hands-and-knees position after the study period. Of the 35 women who used hands-and-knees position after the study hour, 33 (94%) used the position for less than 1 hour.

Of the 124 women who responded to the question, 104 (84%) would use hands-and-knees position in a future labor, with 48 (46%) citing increased comfort

Table 1. Baseline Characteristics of Women Randomized (n = 147) (Values are Numbers [Percentages] of Women Unless Otherwise Indicated)

	Intervention Group (n = 70)		*Control Group (n = 77)*	
Characteristics at Entry	*No.*	*(%)*	*No.*	*(%)*
Gestational age (wks^{days}):				
37^0–40^6	53	(76)	61	(79)
$\geq 41^0$	17	(24)	16	(21)
Mean (SD, range) maternal age (yr)	28.9	(6.2, 17–40)	27.4	(5.8, 18–39)
Nulliparous	44	(63)	48	(62)
Intact membranes	40	(57)	32	(42)
Spontaneous onset of labor	59	(84)	56	(73)
Cervical dilation at most recent exam (cm)				
Not assessed within last hour	18	(26)	25	(32)
< 3	9	(13)	10	(13)
3–6	40	(57)	40	(52)
> 6	3	(4)	2	(3)
Obstetrical status				
Epidural analgesia in situ	13	(19)	17	(22)
Previous cesarean	0		2	(3)
Augmentation	7	(10)	10	(13)
Education				
< Secondary	13	(19)	15	(19)
Secondary	21	(30)	26	(34)
Postsecondary	33	(47)	33	(43)
Not recorded	3	(4)	3	(4)
Married/stable relationship	59	(84)	69	(90)

Table 2. Comparison of Maternal and Neonatal Outcomes Between Treatment Groups (Values Are Numbers [Percentages] of Women, and *p* Values Are for X^2 Test Unless Otherwise Indicated)

	Intervention Group (n = 70)		*Control Group* (n = 77)			
Outcomes	*No.*	*(%)*	*No.*	*(%)*	*Relative Risk (95% CI)*	p
Fetal head position following 1-hr study period						
OP	49	(70)	57	(74)		
OT	8	(11)	11	(14)		
Not assessed	2	(3)	4	(5)		
OA	11	(16)	5	(7)	2.42 (0.88 to 6.62)	0.18
Operative delivery	17	(24)	24	(31)	0.78 (0.46 to 1.32)	0.35
Fetal head position at delivery						
OP	12	(17)	25	(33)		
OT	7	(10)	1	(1)		
Not recorded	10	(14)	15	(19)		
OA	41	(59)	36	(47)	1.25 (0.92 to 1.71)	0.35
Perineal trauma	40	(57)	43	(56)		0.87
Apgar score <7 at 1 min	5	(7)	11	(14)	0.5 (0.18 to 1.37)	0.16
Apgar score <7 at 5 min	0		2	(3)		0.50*
Median (IQR) time from randomization to delivery (hr)	5.1	(2.8, 8.5)	6.3	(3.4, 10.0)		0.33†
Mean (SD) LAS scores	(*n* = 68) 49.58	(10.30)	(*n* = 70) 50.12	(11.22)		0.77‡

**Fisher exact test.*
†*Wilcoxon test.*
‡t *test.*
OP = Occipitoposterior; OT = occipitotransverse; OA = occipitoanterior; IQR = interquartile range; LAS = Labor Agentry Scale.

and 38 (37%) listing improved labor progress as reasons for use. Of the women who stated they would use this position in a future labor, 32 (30.8%) had not used the position in the current study.

Discussion

The effect size used to calculate the sample size for the study was based on data from the only trial found in a systematic review of hands-and-knees positioning (19). In that trial, 75 percent of the fetuses in the 4 experimental groups rotated to occipitoanterior, compared with none in the control group. We postulated that a smaller effect size of 25 percent for our trial was reasonable, since women would be enrolled in labor and since the previous trial had used an unreliable method of determining fetal head position. Given that the rate of rotation we found was much lower than in the trial of antenatal use of hands-and-knees positioning, the effects of labor progress may be an even stronger influence on fetal head rotation than originally thought. To have adequate power to detect the 9.2 percent difference we observed, a sample size of 364 would be required. Our trial had only 58 percent power to detect a 9.2 percent absolute difference in occipitoanterior presentation after the intervention (p1 = 0.157, p2 = 0.065, alpha = 0.05, beta = 0.20). The sample size for our trial may not be large enough to determine if the 9.2 percent difference found between groups was real or due to chance. With respect to clinical significance of the findings, an absolute increase of 9.2 percent in occipitoanterior position after use of hands and knees positioning is likely to be viewed as worth the time and effort spent by clinicians and laboring women to use hands-and-knees position, given the low-risk, low-cost, noninvasive nature of the intervention. Similarly, although no statistically significant differences were found between study groups on other outcomes, trends toward benefit were noted with respect to operative delivery and length of labor. An absolute risk reduction of 7 percent in operative delivery with use of hands-and-knees positioning (number needed to treat = 15) and a reduction in labor time of 1.2 hours are likely to be considered clinically significant for both clinicians and laboring women.

Although the sample size is too small to justify subgroup analyses, factors that might facilitate or impede the ability of the fetal head to rotate to an

occipitoanterior position merit further research. Most women were randomized when at least 3 cm dilated, and over one-half had ruptured membranes; the study was one of active labor. The effects of hands-and-knees positioning may be influenced by degree of dilatation, engagement, and membrane status.

Following discussion with expert clinicians, the length of the intervention was chosen based on 1 previous trial that found an effect of hands-and-knees positioning in the antenatal period with 10 minutes of use (7). We considered that 30 minutes over a 1-hour period was a large enough dose of the intervention to effect rotation, and yet a sufficiently brief amount of time that it would not discourage women from enrolling in the study, or limit their ability to choose positions during labor. The possibility exists that with more time spent in hands-and-knees position, fetal head rotation is more likely.

The findings of our trial indicated that hands-and-knees positioning was effective in reducing persistent back pain; what is less clear is the meaning of this reduction in pain scores to the laboring woman. Unfortunately, very little is known about the clinical significance of reductions in pain. What little information exists suggest that on a 10-point VAS, a 2-point reduction in pain scores is clinically

Table 3. Persistent Back Pain Scores (Values Are Mean Differences of Pre-intervention and Post-intervention Scores [95% CI] and *p* Values Are for *t* Test; Pain Scores Post-intervention Were Subtracted from Pain Scores Pre-intervention; a Negative Pain Score Difference Indicates a Reduction in Pain Score)

Pain Score	*Intervention Group*	*Control Group*	*Between-Treatment Group Difference*	p
VAS (score range 0–10)	(*n* = 65) −0.77 (−1.23, −0.31)	(*n* = 74) 0.08 (−0.35, 0.51)	−0.85 (−1.47, −0.22)	0.0083
PPI (score range 0–5)	(*n* = 65) −0.34 (−0.65, −0.02)	(*n* = 75) 0.16 (−0.09, 0.41)	−0.50 (−0.89, −0.10)	0.014
Word descriptors (score range 0–45)	(*n* = 64) −2.75 (−4.56, −0.93)	(*n* = 73) −0.15 (−1.65, 1.35)	−2.60 (−4.91, −0.28)	0.028

VAS = Visual Analog Scale; PPI = Present Pain Intensity.

Table 4. Labor and Delivery Events After Randomization (*n* = 147) (Values Are Numbers [Percentages] of Women Unless Otherwise Indicated)

	Intervention Group (n = 70)		*Control Group* (n = 77)	
Events After Randomization	*No.*	*(%)*	*No.*	*(%)*
Labor augmentation*:	25	(36)	32	(42)
Oxytocin	25	(36)	32	(42)
Prostaglandins	0		1	(1)
Analgesia/anesthesia*:	40	(57)	42	(55)
IM/IV narcotic	7	(10)	11	(14)
Epidural	22	(31)	24	(31)
Spinal	1	(1)	0	
Combined spinal/epidural	3	(4)	1	(1)
General	0		1	(1)
Nitrous oxide	5	(7)	7	(9)
Local	10	(14)	9	(12)
Pudendal	0		2	(3)
Method of fetal monitoring:				
Intermittent auscultation	19	(27)	18	(23)
Continuous electronic	27	(39)	33	(43)
Intermittent electronic	16	(23)	16	(21)
Internal electronic	8	(11)	10	(13)
Median (IQR) maternal length of stay (hr)	49.5	(40.7, 65.2)	54.1	(39.5, 67.8)
Median (IQR) neonatal length of stay (hr)	49.9	(40.7, 65.8)	58.0	(41.1, 67.8)
Median (IQR) birthweight (g)	3,385	(3,220, 3,760)	3,420	(3,150, 3,756)

**Some women received more than one type of medication.*
IV/IM = Intravenous/intramuscular; IQR = interquartile range.

important (20,21). The between-treatment group difference of 0.85 points found in our trial is less than this suggested clinically important difference. However, the studies of clinically important pain score differences include men, chronic pain patients, and emergency room patients, most of whom received pharmacological interventions for their pain and then evaluated to what degree their pain was better or worse. It is difficult to say if a 2-point difference in pain score would mean the same to a man with chronic neuralgic pain as it would to a laboring woman with persistent back pain. Furthermore, it may be unreasonable to expect the same magnitude of change in pain scores with the use of nonpharmacological interventions such as positioning techniques, as with pharmacological agents. Finally, the experience of persistent back pain during labor is a highly specific component of labor pain, and one which women are easily able to distinguish (14,22,23). The very specific nature of persistent back pain may result in more precise determinations of pain reduction, making small differences in pain scores clinically significant.

Although persistent back pain is not a good predictor of labor in occipitoposterior position, as many as 35 percent of women experience such pain during labor (14,22,23). It remains to be seen if hands-and-knees positioning would be similarly effective in reducing persistent back pain for women laboring with the fetal head in other positions. Answering this question might give further insight to the mechanisms by which hands-and-knees position is effective.

An indirect measure of the clinical significance of the pain reduction conferred by use of hands-and-knees positioning is demonstrated by the participants' adherence to the trial protocol, their use of this positioning after the intervention period, and their interest in using the position in future labors due to increased comfort. Compliance with group assignment was excellent, and many women used hands-and-knees position after the study period, including women in the control group who were not actively encouraged to do so. However, it is difficult to draw inferences about women's preferences, given the influence of other factors on ability to use hands-and-knees positioning. Some women may have wished to use hands-and-knees position after the study period but were unable to do so. Clinician preferences about positioning may be influential; some women may need assistance, encouragement, or approval from clinicians in order to use hands-and-knees position. Use of interventions, such as electronic fetal monitoring and decreased mobility due to increased anesthesia, may have made use of hands-and-knees positioning difficult.

Women who used hands-and-knees position, as well as those who did not, expressed interest in using this position in a future labor and thought it would confer benefit related to labor progress or comfort. Although not a measure of effectiveness of the intervention, such interest in use of hands-and-knees position, even for women who did not actually use the technique, speaks to the importance of active positioning for women in labor. Active positioning during labor may facilitate feelings of control or active participation in labor, which leads to increased satisfaction with childbirth (24,25). It was expected that differences related to this aspect of the labor experience might be detected by Labor Agentry Scale scores. The lack of difference between groups in the current study is consistent with those of other recent trials of interventions during pregnancy and birth (26–28), however, suggesting that the scale, although internally consistent and reliable, is not a sensitive measure.

Potential sources of bias exist. Since some women in the control group used hands-and-knees positioning after the study period, this may have affected fetal head position at delivery, mode of delivery, and length of time from randomization to delivery, thus diluting the treatment effect. Although the generalizability of multicenter studies benefits from heterogeneous samples, in trials with small sample sizes, this heterogeneity may also contribute increased variability in trial procedures and treatment differences. We limited such threats to validity by standardizing the intervention and outcome assessment features of our trial.

Conclusions

This trial provides evidence of reductions in persistent back pain, acceptability to laboring women, and no evidence of harm with use of maternal hands-and-knees positioning during labor with a fetus in occipitoposterior position. Hands-and-knees positioning should be offered to women laboring with a fetus in occipitoposterior position in the first stage of labor to reduce persistent back pain. Although this study demonstrates trends toward improved birth outcomes, further trials are needed to determine if hands-and-knees positioning promotes fetal head rotation to occipitoanterior and reduces operative delivery.

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