



A randomised controlled trial in comparing maternal and neonatal outcomes between hands-and-knees delivery position and supine position in China



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ABSTRACT

Background: the supine position is the most frequently offered for birth delivery in China and many other countries, but the hands-and-knees position is now gaining prominence with doctors in China. This study aims to examine the differences in maternal and neonatal outcomes among low-risk women who gave birth either in the hands-and-knees position or the supine position.

Methods: a randomised controlled trial was conducted in 11 hospitals in China from May to December in 2012. In total, 1400 women were recruited and randomly allocated to either the experimental group ($n=700$, 446 completed the protocol) who delivered in hands-and-knees position and the control group ($n=700$, 440 completed the protocol) who delivered in supine position. Women who could not maintain the randomised position during the second stage of labour were allowed to withdraw from the study. The primary maternal outcome measured was rate of episiotomy. Secondary outcomes included degree of perineum laceration, rate of emergency caesarean section, rate of shoulder dystocia, and duration of labour, postpartum bleeding, neonatal Apgar score, and the rate of neonatal asphyxia. Because outcome data were only collected for women who gave birth in the randomised position, per-protocol analyses were used to compare groups. The primary outcome, episiotomy, was also compared between groups using logistic regression adjusting for maternal age, gestational age at birth, whether the woman was primiparous, the process of second stage of labour and birthweight.

Findings: as compared with the control group, the experimental group had lower rates of episiotomy and second-degree perineum laceration (including episiotomy), and higher rates of intact perineum and first-degree

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perineum laceration, with a longer duration of second stage of labour. No significant differences were found in the amount of postpartum bleeding, shoulder dystocia, neonatal asphyxia and neonatal Apgar scores at 1 minute and 5 minutes. Adjusted for maternal age, gestational age, parity, duration of second stage of labour and birth weight, the hands-and-knees position reduced the need for episiotomy (OR=0.024, $p < 0.001$).

Conclusions: this study provided evidence that women who could maintain the hands-and-knees position during the second stage of labour had lower rates of episiotomy and second-degree perineum laceration (including episiotomy). Both midwives and obstetricians are suggested to learn the skills to assist women with delivery in this position.

Introduction

China holds the highest caesarean section rate (54.47%) worldwide (Hou et al., 2014). In addition, the rate of episiotomy is as high as 90% in some Chinese hospitals (Xu and Yao, 2002). Caesarean delivery carries approximately twice the risk of maternal mortality (Deneux-Tharaux et al., 2006; Villar et al., 2007), as well as an increased risk of maternal and perinatal morbidity (Villar et al., 2007). Episiotomy increases the risk of damage to the pelvic floor muscles, causing more postpartum pains and complications such as urinary retention and prolonged recovery of sexual activity (Woolley, 1995; Roberts and Hanson, 2007). It is imperative to find effective ways to lower the rate of caesarean section and episiotomy by rigorous promotion of natural birth.

The upright position is recommended by the World Health Organization (WHO) Normal Birth Guideline (World Health Organization (WHO), 1996) as a simple and low cost intervention to increase the likelihood of normal vaginal birth. Upright positions during childbirth can benefit women in labour by allowing spontaneous pushing, more efficient contractions, and a shorter second stage of labour, fewer interventions, and easier handling of the labour pains (Gardosi et al., 1989; Bodner-Adler et al., 2003; Gupta and Hofmeyr, 2004; De Jonge et al., 2008).

As one such upright position, the hands-and-knees position is assumed to have many benefits (Stremler et al., 2005). In this position, the labouring woman resembles a crawling baby with all four limbs on the floor or bed so that her abdomen is suspended and her hips are at a right angle to the floor or bed (Bruner et al., 1999). It is reported that the hands-and-knees position results in the widest pelvic outlet, which then facilitates the fetal head descent and turn, lowering the incidence of shoulder dystocia. The position is also offered as a method of intervention when shoulder dystocia is suspected called 'Gaskin's manoeuvre' (Bruner et al., 1999). In a previous study, 83% of shoulder dystocia was resolved by using single Gaskin manoeuvre, e.g., a transition to the hands-and-knees position after the foetal head is delivered (Bruner et al., 1998). In a pilot trial (Stremler et al., 2005), the hands-and-knees position was proved to be helpful for converting the occipitoposterior (OP) to occipitoanterior (OA) presentation during labour. However, it did not provide information as to whether or not the women delivered in hands-and-knees position (Stremler et al., 2005). A pelvimetry performed for 35 non-pregnant female volunteers in the supine, hands-and-knees and squatting positions revealed that the sagittal outlets [11.8 cm (SD 1.3) and 11.7 cm (SD 1.3)] in the hands-and-knees and squatting positions were significantly larger than those in the supine position [11.5 cm (SD 1.3); $p=0.002$ and $p=0.01$, respectively]. The interspinous diameter was also significantly larger [11.6 cm (SD 1.1) and 11.7 cm (SD 1.0) versus 11.0 cm (SD 0.7); $p < 0.0001$, in both cases]. Thus, the hands-and-knees and squatting positions might have the potential of facilitating delivery (Russell, 1969; Michel et al., 2002). The pelvic is tilted anteriorly in the supine position, and the presenting part is forced to travel posterior into the curve of the sacrum and then move upwards again, forming an S-shaped route and therefore making the travel more difficult for the fetus. When the woman takes a curling or leaning forward posture, the spine and the pelvis form a C-shaped passage, allowing the fetus to pass

through more easily (Mendez-Bauer, 1975). In a previous controlled trial conducted in China (Guo and Zhang, 2011), a total of 203 women were randomised to deliver in the hands-and-knees position ($n=100$) or the supine position ($n=103$). The numbers able to maintain their randomly allocated positions were 51 in the hands-and-knees group (51% compliance) and 60 in the supine group (58%). The results revealed the experimental group had a shorter second stage of labour ($p < 0.05$) and a lower rate of episiotomy ($p < 0.05$) without any increased rate of neonatal asphyxia.

Despite its advantages and benefits for mothers and neonates, some researchers complain about the disadvantages to this childbirth position because of some difficulties when having to hold the position for a protracted period of time. For example, in a recent study conducted in the United States (Hodnett et al., 2013), 30 nulliparous women in labour were randomly allocated into either an experimental group (taking hands-and-knees position) or a control group (using any other position) for 15 minutes every hour during labour. Only 9 out of the 16 women allocated to repeated hands-and-knees position used it more than twice. Poor compliance and acceptability were found in hands-and-knees position. Poor compliance and acceptability were found in hands-and-knees position. Offered in certain circumstances, however, compliance might be improved; for example, if the woman delivers only in her labour bed with a local analgesic and foetal heart monitors.

To the best of our knowledge, very few studies have been conducted to compare the effects of the hands-and-knees position and the supine position on the maternal and neonatal outcomes. Although the hands-and-knees position has been shown advantageous by a few previous studies, its clinical application is difficult to demonstrate without compelling evidence from a larger scale study. Therefore, a multi-centred clinical study is necessary to investigate the feasibility and safety of the position, as well as its effect on maternal and neonatal outcomes. To address this concern, we designed this study, aiming to compare the maternal and neonatal outcomes in low-risk women randomised to give birth in the hands-and-knees position or the supine position and to examine the factors impacting the rate of episiotomy. In the study, it is hypothesised that:

1. When compared with the women in the control group, women in the experimental group would have a higher rate of intact perineum and lower rates of perineum laceration and episiotomy;
2. When compared with the women in the control group, women in the experimental group would have lower rates of emergency caesarean section, shoulder dystocia, and shorter labour duration;
3. When compared with the women in the control group, women in the experimental group would have better foetal outcomes defined as higher Apgar scores at 1 minute and 5 minutes, and lower rates of neonatal asphyxia;
4. The hands-and-knees position and multiparous status would offer protection against episiotomy.

Methods

Design

This was a prospective, two-group randomised controlled trial.

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