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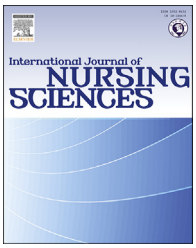

Original Article

Comparing maternal and neonatal outcomes between hands-and-knees delivery position and supine position

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ABSTRACT

Background: The supine position is the most common birth position adopted in China, but the World Health Organization recommends non-supine positions for delivery. The hands-and-knees position shows several advantages, such as wide pelvic diameter and easy fetal rotation during delivery. Small trials conducted in China in 2011 revealed that the hands-and-knees position resulted in improved maternal and neonate outcomes than those in the supine position. However, a comprehensive study must be conducted before the hands-and-knees position can be introduced into clinical practice. Hence, we conducted this multicenter trial to comprehensively examine the benefits of the hands-and-knees position over the supine position during delivery.

Methods: Our clinical study was conducted in 11 hospitals in China from May to December 2012. A total of 446 pregnant women who gave birth in the hands-and-knees position were assigned into the experimental group, and 440 women who gave birth in the supine position were classified into the control group. Episiotomy rate was evaluated as the primary outcome, and perineum laceration degree was considered the secondary outcome.

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Results: Women in the experimental group achieved lower rates of episiotomy and higher rates of intact perineum and first-degree perineum lacerations compared with those in the control. Postpartum bleeding amount, neonatal asphyxia, and APGAR scores at 1 and 5 min were not significantly different between the two groups.

Conclusions: This study proves that women who delivered in the hands-and-knees position achieved low rates of episiotomy and intact perineum. Moreover, the rates of neonatal asphyxia and postpartum bleeding did not increase. Pregnant patients who prefer to adopt the hands-and-knees position should be assisted in assuming such position during delivery.

1. Introduction

The up-right position is a simple and low-cost intervention that increases the likelihood of normal vaginal birth [1]. Up-right positions (including standing, sitting, and hands-and-knees) during childbirth can benefit women by allowing spontaneous pushing, efficient contractions, short second stage of labor, less intervention, and high patient tolerance to labor pain [2–4].

Limited information is available regarding the advantages and disadvantages of different "non-supine positions". No significantly different reported between kneeling and upright sitting delivery positions [5] or between using a birthing seat and any other delivery position [6]. The hands-and-knees position involves laboring woman "on all fours", which means being prostrate with four limbs on the floor or bed, similar to a crawling baby [7]. In this position, the abdomen is suspended and the hips are at a right angle to the floor or bed [7]. The hands-and-knees position results in a wide pelvic diameter, which facilitates the descent and rotation of the fetal head and decrease the incidence of shoulder dystocia [7]. The hands-and-knees position can also convert the occipitoposterior presentation to occipitoanterior during labor [8].

In a previous study [9], pelvimetry was performed in 35 non-pregnant female volunteers who assumed supine, hands-and-knees, and squatting positions. The results revealed that the sagittal outlet in the hands-and-knees (11.8 ± 1.3 cm) and squatting (11.7 ± 1.3 cm) positions exceeded that in the supine position (11.5 ± 1.3 cm; $p = 0.002$ and $P = 0.01$, respectively). Similar observations were noted in interspinous diameters (11.6 ± 1.1 and 11.7 ± 1.0 cm vs. 11.0 ± 0.7 cm; $P < 0.0001$, in both cases). Thus, both hands-and-knees and squatting positions can facilitate delivery [9,10]. In the supine position, the pelvis is tilted anteriorly in the supine position; the presenting part is forced to travel posteriorly to the curve of the sacrum and then moves again upward in an S-shaped curve, thereby complicating fetal descent. When a pregnant woman is in the hands-and-knees position, the spine and pelvis assume a C-shaped curve, which facilitates fetal passage [11]. Hence, this position was recommended by Inner May Gaskin as an efficient method to resolve shoulder dystocia (Gaskin maneuver) [12]. Based on the literature, the hands-and-knees position provides the optimal benefits, including wide pelvic diameter and easy fetal passage [11].

Although the hands-and-knees position exhibits theoretical advantages, the clinical application of this technique is severely hampered by the lack of compelling evidence to support its effectiveness. This position was investigated in a study with small sample size in China [13]; in this study, 113 women were randomized into two groups, namely, women who gave birth in the hands-and-knees position (experimental group, $n = 51$) and those who delivered in the supine position (control group, $n = 62$). The experimental group showed shorter second stage of labor and lower rates of episiotomy without increasing the rate of neonatal asphyxia. However, introducing this position to clinical application is limited by the lack of solid scientific evidence [14]. Hence, the hands-and-knees position must be further investigated using multi-center clinical studies. The present study aims to compare maternal and neonatal outcomes between low-risk women randomized to birth with the hands-and-knees and supine positions and examine factors affecting the rate of episiotomy.

2. Methods

2.1. Design

This study is a prospective, two-group randomized, controlled trial.

2.2. Setting and participants

The study participants included women who gave birth at 11 hospitals in China selected by convenience; these hospitals included five maternal and child health hospitals and seven general hospitals. Data were collected between May and December 2012. During this period, the average annual birth number in the 11 participating hospitals was 14,000. The inclusion criteria included a) having a healthy, uncomplicated pregnancy without any medical diagnosis; b) anticipating vaginal delivery of a singleton fetus in cephalic presentation and longitudinal lie and spontaneous onset of labor at gestational weeks between (37 + 0) and (41 + 6); and c) The body-