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Review Article

Various birthing positions and their effects on fetomaternal outcome during labour: a comprehensive review

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ABSTRACT

Labour and delivery are major challenges globally, especially in developing countries. Labouring women should be allowed to choose their preferred positions and avoid staying in supine position for prolonged periods as per WHO recommendation. However, studies indicate that most of the women still give birth in a lying or semi-sitting position. This research focuses on determining the most effective birthing positions than the supine one and empowering women to select the most comfortable posture during labour. We have searched a thorough electronic database, including Google Scholar, PubMed, and the Cochrane Library, using key terms such as "labour positions", "alternate birthing positions" and "fetomaternal outcomes." After applying inclusion and exclusion criteria, we integrated total 41 studies into this review. Upright positions, birth stool, birth chair, squatting and peanut ball positions improve labour outcomes for both mother and fetus compared to supine or lithotomy positions, but may increase risk of perineal laceration, episiotomy rate and blood losses in mother. Birthing and Swiss balls have a positive effect on fetomaternal outcomes, although they may not be suitable for all women. Semi-sitting and lateral positions have mixed effects. Whereas Water birth benefits the mother but may result in lower fetal Apgar score. Many women still deliver in traditional lithotomy or semi-recumbent positions in developing countries despite the benefits of different alternative birthing positions. Health systems must adopt policies to support these positions and integrate them into midwifery education, with ongoing research to evaluate their effects and address barriers to implementation.

Keywords: Various birthing positions, Labour, Fetomaternal outcome

INTRODUCTION

Pregnancy is a remarkable journey in women's life which is filled with joy, physiological changes and uncertainty. Childbirth process whether by vaginal delivery or by caesarean section, means the start of a new life and end of this pregnancy journey. According to WHO, approximately 140 million births occur globally each year, with the proportion attended by skilled health workers rising to 81% in 2019 from 58% in 1990, due to more births taking place in hospitals.¹ However, home births are still more common in underdeveloped countries.² Vaginal delivery, which has four stages: cervical dilation in the first stage, infant descent and birth in the second stage, placenta delivery in the third stage, and postpartum recovery in the

fourth stage, is the most prevalent technique of childbirth globally.³ Since childbirth is a normal physiological occurrence, the customs surrounding it are vital to the health and well-being of both the mother and the unborn child. The way that a woman gives birth during labour can significantly affect the way that the fetus moves through the obstetric canal, which can affect the course of the pregnancy as a whole.⁴ Maternal birthing positions, also known as childbirth positions, refer to physical positions that a pregnant woman may adopt during childbirth.

In ancient societies history of birthing position in 1882 revealed that pregnant mothers were accustomed to use upright position like standing, sitting, squatting along with the assistive devices like birth stool, ropes and different

furniture to maintain that vertical position during the delivery process.⁴ In 18th century, women began to use supine positions or lithotomy position due to development of obstetric tools like delivery forceps.⁵ Thus, evidence of frequently using supine positions for labour and birth and less use of assisted vaginal births were observed throughout the past few years.^{6,7} The use of anaesthesia, medical convenience, and the perception of a need for more medical control during childbirth all contributed to this change.⁸ The WHO came to the conclusion that labouring women should be allowed to assume whichever posture they desire, as long as they avoid lying down for extended periods of time, in their publication "care in

normal birth". However, in contrast to this, a research study conducted in Nigeria found that 99% of women gave birth in the supine position.⁹ Labor-related biomechanical and physiological changes are significantly influenced by the position of the mother. The effects of delivery positions on parameters such as fetal head moulding, intrauterine pressure, and pelvic size have been studied recently.¹⁰ American college of obstetricians and gynaecologists (ACOG) also recommends that, for most people giving birth, "no one position needs to be mandated nor prescribed". ACOG also states that it is normal for women in labour to adopt various birthing positions.¹¹ Table 1 provides explanation of different types of birth positions.

Table 1: Different birthing positions.

Birthing positions	Description
Traditional birthing positions	
Supine	Back-lying position with arms on the side.
Lithotomy	Lying on the back with legs flexed at the hip and knee joints, supported by leg rests and straps.
Alternative birthing positions	
Squatting	Sitting with lower extremities fully flexed at the knee and hip joints, with the weight of the body on the feet.
Hands and knees	Kneeling while tilting forward, supporting oneself with palms or fists.
Peanut ball	Involves an inflatable, peanut-shaped ball placed between the legs of a labouring woman while lying on her side.
Birthing bars	A bar or handle placed on the birthing bed near the foot to help the labouring person push more effectively by holding onto it.
Upright	Includes various vertical postures like standing, walking, sitting, or leaning forward.
Birthing stools/ chair	Uses a birthing chair or stool to support the woman in an upright or semi-upright posture during childbirth.
Birthing ball/ Swiss ball	A large inflatable ball used to maintain different positions during labour, like sitting, bouncing, or leaning on the ball.
Semi-sitting/ semi-recumbent	Sitting at a slight angle, typically with back support from a reclined surface, such as a bed or chair; knees may be bent and positioned as per comfort.
Lateral	Lying on the left or right side with hips and knees flexed; the top leg is positioned in front of the bottom leg.
Water birth	Giving birth while partially or fully submerged in warm water, usually in a birthing pool or tub designed for labour and delivery.

Labor and delivery are major challenges globally, especially in developing countries. Various complications related to pregnancy and delivery process can significantly influence maternal and fetal morbidity and mortality.¹² Therefore, role of Health care providers is very much important in managing maternal positions during the second stage of labour.¹³ Several research suggested that alternate birthing positions provides the nonpharmacological intervention to accelerate the progress of labour.¹⁴ women will utilize a variety of postures, both supine and non-supine when they will give the option.⁸ Therefore, medical staff should assist women to find the most suitable position for her, which may include an upright position instead of forcing her to adopt traditional supine position.¹⁵

This research endeavours to determine optimal and most effective birthing positions, instead of placing pregnant women in the supine position, the most common and ideal birthing positions after reviewing a number of studies.

Previous reviews mainly focused on effectiveness of upright positions on maternal outcome during the 2nd stage of labour. This review will assess the advantages and disadvantages of various alternative birthing positions on fetus and mother throughout pregnancy and labour. In the end, evaluation of this birthing positions empowers women to make the decision that feels best for their bodies at this crucial time by encouraging expectant parents and medical professionals to think about the possible benefits of incorporating a variety of approaches into their birthing plans. This review promotes a more comprehensive approach to labour and delivery while also honouring the uniqueness of every birth experience.

Objectives

The purpose of this study is to review the existing literature on labour positioning and explore the effect of various birthing positions on fetomaternal outcomes during labour.

LITERATURE REVIEW

We have searched a thorough electronic database, including Google Scholar, PubMed, and the Cochrane Library by using the key terms such as "labour positions," "alternate positions in labour," "labour and delivery positioning," "alternate birthing position," and "fetomaternal outcome." Alternative delivery positioning is defined as any positions used during delivery except supine or lithotomy. This definition includes a variety of positions, like upright postures, squatting, walking, hands and knees, and also use of different positioning aids like stools, peanut balls and bars. Along with database search, we also conducted a hand search of reference list to discover more relevant research. After fulfilling inclusion and exclusion criteria, we integrated total 41 studies into this review.

The study involved both primiparous and multiparous pregnant mothers who have undergone institutional vaginal delivery. Studies published in English only included. Caesarean deliveries, stillbirth or intrauterine deaths, case studies, home birth and women restricted for ambulation during second stage of labour were excluded from the review.

SUPINE POSITION AND LITHOTOMY POSITION

Research evidence showed that pain intensity in second stage of labour is significantly higher in lithotomy position compared to sitting or squatting positions.¹⁶⁻¹⁹ Women in the supine position faced longer labours duration and report lower satisfaction rather than squatting position. Although, there are no significant differences in postpartum blood loss, neonatal birth weight, Apgar scores at one and five minutes, and rates of admission to neonatal intensive care unit between these two positions.^{17,20} Contradictory to this, another study showed that supine position may be associated with lower estimated blood loss and a reduced rate of postpartum haemorrhage.¹⁸

Women in lithotomy positions during the second stage of labour experienced more second-degree perineal tears compared to those in lateral positions. But, episiotomies, rates of intact perineum, and third-degree perineal tear were similar between these two groups.^{20,21} Mean Apgar scores at one and five minutes were also comparable between the supine and birth chair positions.²² Furthermore, transient tachypnoea in newborns was significantly higher in the supine position rather than in lateral or all four positions.²³ Greater incidence of instrumental deliveries and episiotomies were found among women in supine position.¹⁸

SQUATTING POSITION

The squatting position during labour has been shown a positive effect on reduction of labour pain, shorter second stage labour duration, and enhance women's satisfaction levels.^{16,17,19,24-26} Many women naturally adopt deep squat

postures as part of their daily activities in many rural communities globally. These squatting postures during labour helps in reducing waist to hip ratios, improved lumbo-pelvic mobility, physical activity and stronger lower-extremity muscles, all of which combinedly increase the chance of normal vaginal delivery.²⁵

Maintaining squatting posture over 246 minutes per week during pregnancy can lead to positive labour outcomes, evidenced by a modified Bishop score of $\geq 6/10$, and a reduction of labour augmentation. However, there are no significant differences found in delivery methods [vaginal, instrumental and caesarean], episiotomy rates, birth weight, neonatal Apgar scores, postpartum blood loss, or NICU admissions compared to other positions.^{17,26} Contradictory to this, other findings showed that women in the squatting position experience less severe perineal lacerations and fewer episiotomies, but there may be an increased risk of postpartum haemorrhage.^{27,28} The mean length of the second stage of labour is shorter for women in squatting positions-23 minutes less for primiparas and 13 minutes less for multiparas rather than in semi recumbent positions. Also, squatting women need less oxytocin for labour stimulation and tend to have fewer mechanically assisted deliveries.²⁷ Irrespective of these positive outcomes, maintenance of squatting position can be difficult during the second stage of labour. Squatting is more culturally accepted and easier to adopt for Turkish women, also it's a common practice reflecting across various cultures in Anatolia, the Middle East, and Africa.^{17,29,30}

BIRTHING BALL / SWISS BALL

Use of birth ball during labour facilitate positive outcomes, including shorter labour duration, reduced labour pain, and increased satisfaction among women.^{24,31,32} It also provides support for aligning the fetus within the pelvis, helps in fetal descent and relieve pressure on the perineum, thus facilitating cervical dilation and delivery. However, it's important that these exercises may not be applicable for all labouring women, particularly those with fetal malpresentation, complicated pregnancies, multiple pregnancies, or those planned for a caesarean section. Therefore, the use of a birthing ball should be evaluated based on each woman's individual circumstances.³¹

Using of Swiss ball during labour significantly decreased labour duration by 179 minutes in the first stage and 19 minutes in the second stage compared to the conventional supine position. It also reduced pain by about 2 points on a 0-to-10 scale at 30, 60, and 90 minutes, and decreased the risk of caesarean sections and vulvar swelling. It also helps in reducing fatigue of women by 18 points on a 15-to-75-point scale, while anxiety level dropped by 9 points on an 18-to-72-point scale.³³ Incidence of transient tachypnoea in newborns was lesser in all four positions compared to the conventional supine position.²³ This Swiss ball can be used in various positions like seated, on all fours, or leaning to improve mobility. Maximum

benefits will occur when the ball size is proportional to the women's height and the pelvis remains higher than the knees (knee angle >90 degrees).³³

PEANUT BALL

Research evidence showed that inexpensive and effective use of this peanut ball during delivery shorten the labour duration of the active and expulsive phases, as well as the total length of labour. Also, it improves maternal satisfaction with the childbirth experience and lowers the risk of caesarean sections and instrumental deliveries.^{21,34,35} While the effects on other fetomaternal outcomes are either comparable between groups or not well-defined, the lack of a standardized protocol regarding the use of peanut ball limits its ability to consistently predict outcomes.^{21,35}

SEMI RECUMBENT POSITION

Women experience higher labour pain and lower satisfaction in recumbent positions compared to those in upright positions during delivery.^{19,36} First stage of labour duration in upright position is approximately one hour and 22 minutes shorter than the recumbent position. Additionally, women in recumbent positions have longer durations in all stages of labour.³⁶ There are no statistically significant differences were found between semi recumbent and squatting position for third-stage complications and infant complications during labour.²⁷

However, Mother who used semi-recumbent position during delivery showed a higher incidence of newborns with a five-minute Apgar score below 7 compared to those newborns whose mother adopted water birth position during labour.³⁷ This position is also associated with a higher rate of ventouse deliveries and increased risk of second-degree perineal lacerations compared to lateral or walking positions.³⁸ There is also evidence of increased risk of postpartum haemorrhage with Semi-recumbent position and using a birth seat.²⁸

SEMI SITTING

Upright half-sitting position have a lesser risk of first-degree laceration and greater risk of second-degree laceration and frequency of episiotomy during delivery.³⁹ There is increased risk of spontaneous trauma and episiotomy is due to presence of vulvar edema. Research evidence showed that the frequency, intensity and mean duration of the uterine contractions during labour progress are highest in the semi sitting group rather than in dorsal recumbent and lithotomy position.⁴⁰

UPRIGHT POSITION

Walking positions are more effective than sitting in reducing pain intensity during the first stage of labour and yield positive outcomes for primiparous women and their neonates, including lesser caesarean sections and

improved Apgar scores at one- and five-minutes post-birth.^{19,38,41,42} In addition, approximate blood loss and newborn condition (Apgar scores and umbilical artery pH) are similar between alternative upright positions and conventional lateral position.²⁹ The supported sitting position, compared to the supine-lithotomy position, is associated with a reduced duration of both the second and third stages of labour, increased maternal satisfaction, and a lower rate of instrumental deliveries.^{29,43,44} It also leads to fewer reports of severe labour pain, fewer abnormal fetal heart rate patterns, and higher Apgar scores for newborns, with no significant difference in blood loss or the use of episiotomies.⁴⁵ Additionally, some studies indicate a reduction in episiotomy rates and assisted deliveries. However, there is a potential increased risk of blood loss exceeding 500 mL due to perineal edema, as well as a higher likelihood of second-degree tears.^{5,46-49}

Women in upright positions during labor are less likely to receive an epidural, have a higher rate of intact perineum, and experience shorter durations of both the first and third stages of labour.^{29,41,44} Their babies are also less likely to be admitted to the neonatal intensive care unit, although this finding is based on a single trial.⁴¹ Additionally, sacral mobilization and vertical positions during delivery are associated with fewer perineal injuries, benefiting both mother and newborn.⁵⁰

HANDS AND KNEES

Alternative birthing positions, specially kneeling, can be used safely and effectively without the need for specific birthing aids or extensive preparation. These are generally well-received by both parturient and midwives.²⁹ Women who adopted hands-and-knees position during delivery can facilitate in fetal rotation from the occipito-posterior to the anterior position and also accelerate in cervical dilation during active labour.⁵¹ Along with, flexible positions like kneeling, squatting, standing, and sitting help pelvic bone structure by allowing greater coccyx movement and minimizing symphysis pubic widening.⁵²

There were no significant differences found between the hands-knees and lithotomy positions regarding the mean duration of the active phase of the second stage of labour, the overall duration of the second and third stages, incidence of shoulder dystocia, bleeding amounts during the third and fourth stages, six hours postpartum haemoglobin and haematocrit levels, degree of perineal tears and episiotomies, first- and fifth-minute Apgar scores in newborn or the neonate's need for hospitalization and resuscitation.⁵³

LATERAL

The women who adopted lateral position in labour showed lesser mean duration of the second stage of labour in comparison to the supine position and all four positions.^{23,43} In left lateral position less chance of vulvar edema and fewer episiotomies, however they had a greater

incidence of labial lacerations during childbirth process. Pain severity scores during the latent phase were higher in the lateral position compared to walking and semi-recumbent positions, but pain score is less in sitting position.^{38,39} Women who used lateral positions during both the passive and active phases of the second stage of labour experienced significantly more first-degree perineal tears and less second-degree tears compared to those in lithotomy positions. Along with this, there is one- and five-minute Apgar score is below 7 in the neonates from each group, with no significant differences observed between the groups.²⁰

BIRTHING CHAIR AND STOOL

The birth chair is a safe alternative to the delivery table, showing comparable fetomaternal outcomes, including duration of the second stage of labor, maternal haemoglobin levels, breath-holding during pushing, timing of the first cry, cord clamping, and Apgar scores. Both groups had the same incidence of cord around the neck. Additionally, the mean one-minute Apgar scores were significantly higher when the table or chair was positioned more than 30° upright effectively. Besides this, the chair group showed lower arterial pCO₂ levels, with unchanged pO₂ and pH.⁵⁴ While the birth seat helps to potentially reduce the duration of the second stage of labour, some other studies suggest it may not benefit regarding shorter labour or reduced maternal blood loss during childbirth process.^{22,55}

WATER BIRTH

Water birth results in less major perineal trauma compared to birth stool, including lower rates of severe tears, episiotomy, and postpartum haemorrhages. Besides this, infants born in a semi-recumbent position tend to have higher five-minute Apgar scores than those delivered in water birth.³⁷

DISCUSSION

The present review showed that upright and semi sitting position have a higher rate of intact perineum with lesser chance of first-degree laceration but greater risk of second-degree laceration.^{29,39,46,47} This is contradictory to the study findings of Kurnaz et al showed that vertical position increased the risk of first- and second-degree laceration in mother during 2nd stage of labour.⁵⁶ It also found that vertical position has no significant effect on the admission to NICU, first- and fifth-minute APGAR score of baby. But in this study upright positions, birthing stool or chair can improve newborn Apgar scores, lessens fetal heart rate abnormalities and NICU admission of baby.^{41,45,54} Women in squatting, birth ball and water birth positions also experience less severe perineal lacerations and fewer episiotomies in the present study.^{27,31,32,37}

Review study of Jyoti et al found that maternal upright, squatting and sitting position are beneficial for the

maternal and neonatal outcome, whereas traditional supine and lithotomy positions are associated with poor maternal and fetal outcome which are similar to our review findings.⁵⁷ There is less labour pain, labour duration, less need of assisted deliveries, instrumental delivery, caesarean section, increasing cervical dilation and improve women's satisfaction if women utilized alternative birthing positions like upright, squatting, hand knees, Swiss and pea nut ball positions during childbirth process.^{5,17,19,21,33,34,41,44,51} Birthing ball and hand-knees position help in fetal descent and Swiss ball position lessen the incidence of transient tachypnoea in newborn.^{23,31,51} Upright position improve newborn Apgar scores, lessens fetal heart rate abnormalities and NICU admission of baby during labour.^{41,42,45} Pain intensity in second stage of labour is significantly higher in lithotomy position compared to sitting or squatting positions. Women in the supine position faced longer labours duration and report lower satisfaction rather than squatting position.¹⁶⁻¹⁹

Satone et al review showed that supine position has greater incidence of fetal heart rate abnormalities and less chance of spontaneous vaginal delivery than lateral or upright position which is similar to this study findings.⁸ In current review result, transient tachypnoea in newborns was significantly higher in the supine position rather than in lateral or all four positions.²³ Greater incidence of instrumental deliveries and episiotomies were found among women in supine position.¹⁸ They have also identified that sitting position decreased the second stage labour duration but in present review, supported sitting position is associated with a reduced duration of both second and third stage of labour.⁵

This current review suggests that vertical positions like upright, sitting, and semi-recumbent either increased risk of PPH or no clear difference in blood loss compared to the traditional supine position during childbirth.^{20,28,47,48} However, Bhalero et al found in their review study that vertical positions are more effective in reducing blood loss than horizontal positions.⁵⁸

In India, option for implementing different birthing positions to women remains limited. Hence study related to obstacles or challenges faced during implementation of this alternative birthing position should be recommended. Furthermore, exercises initiated during the antenatal period, such as maintaining a squat posture during daily activity, can enhance mobility and potentially shorten labour duration. Thus, studies related to effect or relation of different posture in pregnancy and their outcome during all stages of labour process can be emphasized.

Now-a-days there is increased rate of caesarean delivery, not only due to medical indication but also sometimes driven by personal choice along with disrespect and abuse received during vaginal delivery. Therefore, women should be provided Respectful Maternal Care along with choice of birth companion during different birthing technique for successful promotion of Normal Vaginal

delivery. Emphasis should be given to the women to choose their preferred birthing positions, which lead to positive result in birthing satisfaction.

CONCLUSION

Maternal birthing position during labour significantly influences both maternal and fetal outcomes. Upright positions, birthing chair, stool, peanut ball and squatting position offer various advantages over traditional supine or lithotomy positions. While birthing balls and Swiss balls can enhance feto-maternal outcomes, they may not be suitable for all women. Semi-sitting and lateral positions have mixed effects on both mother and baby.

Despite the benefits of alternate birthing positions, many women still deliver in lithotomy or semi-recumbent positions due to convenience for healthcare providers. To empower women with informed choices of different birthing position during labour, health systems have to develop policies that support alternative labour positions and integrate these practices into midwifery education. Ongoing research is necessary to evaluate the effects of various labour positions on maternal and neonatal health, identifying the barriers to implement these alternative positions, and understand women's preferences to enhance their overall satisfaction during childbirth process.

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