



EFFECTIVENESS THE INFLUENCE OF DEEP SQUAT EXERCISE ON THE ACCELERATION OF CERVICAL DILATION IN PRIMIGRAVIDA MOTHERS IN THE ACTIVE PHASE OF LABOR

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ABSTRACT

Prolonged labor in primigravida mothers is often caused by tension in the pelvic and cervical muscles that have never experienced stretching. Deep squat exercises are one of the non-pharmacological interventions based on an upright position that are utilized to assist in the descent of the fetal head and accelerate cervical dilation. Objective: To analyze the effect of deep squat exercises on the acceleration of cervical dilation in primigravida mothers during the active phase of the first stage of labor. Method: Quasi-experimental research with a two-group posttest-only control group design. The sample consisted of 30 primigravida parturients selected using purposive sampling in the active phase of the first stage of labor, divided into an intervention group (deep squat, n=15) and a control group (standard labor care/left lateral position, n=15). Analysis showed a significant difference in the number of mothers experiencing a fast labor duration during the active phase of the first stage of labor between the experimental group (n=11) and the control group (n=4). The results of the analysis using the nonparametric Kolmogorov-Smirnov test showed $p=0.009$ ($p \leq 0.05$), indicating that there is a significant effect of the deep squat position on the duration of the first stage of active labor. Conclusion: Deep squat exercises have a significant effect in accelerating the cervical dilation process in primigravida mothers during the active first stage of labor.

Keywords: active phase of first stage; cervical dilation; deep squat; primigravida

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INTRODUCTION

Childbirth is the expulsion of the conception product during a full-term pregnancy without complications for the mother and baby. Prolonged labor can cause the mother to feel anxious and scared. In addition, prolonged labor can occur due to insufficient uterine contractions (His), which hinder the progress of labor (Desyanti and Widad, 2023). According to Budiarti (2022), such conditions can lead to maternal death and bleeding before and after childbirth.

The active phase of the first stage of labor is a critical period characterized by cervical dilation from 4 cm to complete dilation (10 cm). During this phase, cervical effacement occurs before or simultaneously with dilation, and labor progression is generally slower in primigravida women than in multigravida women (NICE, 2023). Upright maternal positions, particularly the deep squat position, optimize the effect of gravity by facilitating fetal head descent and increasing continuous pressure on the cervix. This mechanical stimulation activates the Ferguson reflex, promoting the release of endogenous oxytocin, strengthening uterine contractions, and enhancing cervical dilation. Therefore, deep squat exercise is considered an effective non-pharmacological intervention to accelerate labor progress in primigravida women (Himas et al., 2023).

According to the latest global report by WHO, UNICEF, UNFPA, the World Bank Group, and UNDESA, an estimated 260,000 women worldwide died due to complications of pregnancy and childbirth in 2023 (WHO et al., 2025). According to the Indonesian Ministry of Health (2024), the number of maternal deaths in Indonesia increased in 2023 to 4,482 lives and in 2022 to 3,572 lives.

Also noted that the main causes of maternal and infant mortality are prolonged labor at 38.2%, bleeding at 35.26%, and eclampsia at 16.44% (Wayan et al., 2022). Prolonged labor can increase morbidity and mortality rates for mothers and infants. In mothers, prolonged labor can cause infections, uterine rupture, fistula formation, and injuries to the pelvic floor muscles, which can lead to death. However, the fetus can experience infection, cerebral trauma, injury, and asphyxia, all of which potentially increase the risk of infant mortality (Yeshitila et al., 2022). Therefore, prolonged labor should be prevented with non-pharmacological techniques such as deep squats.

Deep squat or deep squatting is one of the basic functional movements that executes maximum flexion of the hips, knees, and ankles until the buttocks are positioned lower than the knee line. Mechanically, this movement integrates the work of large muscles such as the gluteus maximus, quadriceps, and hamstrings, while also demanding flexibility of the hip and ankle joints. When performed correctly, the deep squat triggers core muscle engagement (core stability) that helps maintain the natural curvature of the spine and balance the distribution of body weight (Straub & Powers, 2024).

In the context of reproductive health and the childbirth process, deep squat plays a crucial role as a non-pharmacological physical intervention. This movement utilizes gravitational force to assist in the descent of the lowest part of the fetus into the pelvic inlet. Anatomically, the squatting position can widen the diameter of the pelvic outlet by 20–30%, while simultaneously providing constant mechanical pressure from the fetal head to the cervix. This pressure stimulates the Ferguson Reflex to trigger the release of natural oxytocin hormones, which directly impacts the acceleration of cervical thinning and dilation. (Himas, N. S. R., et.al 2023) The benefits of deep squat on the childbirth process: Expanding Pelvic Capacity: This position stretches the pubic symphysis and sacroiliac joints, thereby widening the diameter of the pelvic outlet by 20–30% compared to the supine position. (Siccardi et al., 2021)

Utilizing Gravitational Force: Helps push the lowest part of the fetus (the head) down faster and constantly presses the cervix (Kibuka et al., 2021) Stimulating the Release of Natural Oxytocin: The pressure of the fetal head on the cervix triggers the Ferguson Reflex, which is a nerve stimulation that increases the production of the hormone oxytocin to strengthen and trigger the continuity of uterine contractions (his). (de Verastegui-Martín et al., 2023) Accelerating Cervical Dilation: The combination of gravitational pressure and adequate contractions helps accelerate the thinning (effacement) and dilation/opening of the cervix, thereby shortening the duration of the first stage of labor. (Kibuka et al., 2021) Relaxing the Pelvic Floor Muscles: Helps to relax the levator ani muscles, reduce soft tissue resistance, and facilitate the internal rotation of the fetal head.

Reducing Labor Pain: Reducing pressure on the lower back and sacral area, providing a greater sense of control and comfort for the mother. (Al Aryani et al., 2022) Improving the Efficiency of Pushing (Stage II): Maximizing the abdominal muscle's pushing power during labor, thereby shortening the duration of Stage II and minimizing the risk of medical interventions such as episiotomy or assisted delivery. (Satone & Tayade, 2023). Heni Sumastri (2023) conducted a study entitled The Effect of Upright Position on the Length of Labor During the First Active Phase. The aim of the study was to determine the effect of upright maternal positioning on the duration of the active phase of the first stage of labor. The findings demonstrated that maternal birth position significantly influences the labor process, with the upright position effectively accelerating and shortening the duration of the first active phase of labor.

METHOD

Research Design and Location This study uses a Quasi-Experimental design (Two-Group posttest-only). The research was conducted in the working area of the Maros district health center from October 2026 to November 2026. Population of primigravida mothers in the first stage of active labor (4 cm dilation, single fetus, cephalic presentation, gestational age 37–42 weeks, intact membranes). The sample size was 30 respondents selected through purposive sampling.

Instruments & Data Analysis: Partograph observation sheet to record cervical dilation time (cm/hour). The instrument used was a standardized WHO partograph observation sheet, not a questionnaire, so psychometric validity and reliability testing (e.g., Cronbach's alpha) was not applicable. Cervical dilation was assessed through vaginal examination performed by trained midwives following standard clinical procedures to ensure measurement consistency. Data were analyzed using the non-parametric Kolmogorov-Smirnov test with a significance level of $\alpha=0.05$. **Research Procedure for the Intervention Group:** Performing deep squat exercises for 3–5 cycles during the active phase (each cycle lasting 10–15 minutes alternating with rest/comfortable position). **Control Group:** Receiving standard labor care (left lateral position or flexible supine position).

RESULT

Table 1.
Frequency Distribution of Respondent Characteristics (n=30)

Characteristics	f	%
Years old		
20-35	27	90
20 < x > 35	3	10
Education		
Higher Education	21	70
Lower Education	9	30
Employment		
Employed	6	20
Unemployed	24	80
Duration of Phase I Active		
Fast (< 6 hours)	15	50
Normal (6-8 hours)	7	23,4
Slow (>8 hours)	8	26,6

The research results in Table 1 show that the majority of the study subjects were aged between 20-35 years (n=27, 90%) and 3 subjects (10%) were older. The study subjects among the mothers in labor had their last education at the high school and college levels (70%), and 24 mothers in labor (80%) were housewives. Out of the total number of study subjects (n=30), the duration of the first stage of active labor was categorized into three categories: fast (duration <6 hours), normal (duration 6-8 hours), and slow (duration >8 hours). Out of the total number of study subjects, 50% of the mothers in labor (n=15) experienced the first stage of active labor in the fast category (less than 6 hours). In this study, (n=11) mothers in the experimental group and (n=4) mothers in the control group were in the fast category. The first stage of active labor in the normal category (6-8 hours) had (n=3) mothers in the experimental group and (n=4) mothers in the control group. The first stage of active labor in the slow category (more than 8 hours) had (n=1) mother in the experimental group and (n=7) mothers in the control group.

Table 2.

Results of the Analysis of the Influence of Deep Squat on the Duration of Active Phase Stage I Labor

Group	Fast		Normal		Slow		Total		P value
	f	%	f	%	f	%	f	%	
Experiment	11	73.3	3	20.0	1	6.6	15	100	0.009
Control	4	26.6	4	26.6	7	46.6	15	100	

Based on Table 2, it is known that the data shows a significant difference between the number of mothers in labor who experienced a short duration of the active phase of the first stage of labor in the experimental group ($n=11$) compared to the control group ($n=4$). The results of the analysis using the non-parametric Kolmogorov-Smirnov test showed $p=0.009$ ($p\leq 0.05$), indicating that there is a significant effect of the upright position on the duration of the active phase of the first stage of labor.

DISCUSSION

Based on the research results, it is known that the majority of subjects in this study are mothers in labor aged twenty to thirty-five years ($n=25$). That age is a healthy reproductive age, the ideal age for becoming pregnant and giving birth because, within that age range, the reproductive and mental organs are more mature. Pregnancy and childbirth at a teenage age or under twenty years old increase the morbidity and mortality rates of mothers and babies by two to four times higher compared to pregnancy and childbirth at the age of 20-35 years. Other studies show that pregnancy at a risky age, namely under twenty years old and over thirty-five years old, will be increasingly at risk of miscarriage.

In this study, the Deep Squat position applied to the experimental group of mothers in labor included standing, squatting, and kneeling positions. According to Satone and Tayade (2023), the Deep Squat position can be in the form of standing alone or holding onto a partner or support, kneeling supported by one leg, kneeling with hands resting on a support, sitting on a birthing chair, or squatting. The results of the study indicate that the Deep Squat position has a positive effect on the duration of the first stage of active labor. It was found that the majority of mothers who applied the Deep Squat position experienced a shorter duration of the first stage of active labor compared to those who did not use the Deep Squat position. This study is in line with the research conducted by Al Aryani *et al.* (2022) on laboring women in Saudi Arabia, which showed that women who adopted upright positions experienced significantly shorter duration of childbirth and faster progress of labor compared to those in recumbent positions. The upright position allows the abdominal wall to relax and the influence of gravity causes the fundus of the uterus to fall forward, which pushes the fetal head toward the pelvic inlet in the anterior position and applies direct pressure to the cervix, thereby helping to stimulate and stretch the cervix.

Research by Yeturi *et al.* (2023) also shows that among primigravida mothers, labor positions outside the bed (lateral and all-fours positions) result in a significantly shorter duration of labor compared to those who lie down in the supine position. When a mother in labor performs the Deep Squat position, the effect of gravity on the body comes into play. The Deep Squat position can help lower the lowest part of the fetus, allowing for effective cervical dilation. Additionally, the Deep Squat position can help the fetus achieve a better position to pass through the pelvis. The Deep Squat position, by squatting, causes the upper pelvic inlet to widen, making it easier for the fetal head to rotate. that can trigger the progress of labor. On the other hand, the Deep Squat position also increases the intensity of uterine contractions, alleviates labor pain, and provides good satisfaction for the mother in labor with the birthing position. (de Verastegui-Martín *et al.*, 2023)

CONCLUSION

Based on the results of this study, it can be concluded that the birthing position affects the labor process. The Deep Squat position can significantly accelerate or shorten the duration of the first stage of active labor. It is hoped that midwives and accompanying healthcare workers will promote and facilitate the use of the Deep Squat position for laboring mothers. The Deep Squat position has been known to have a positive influence on the labor process, so future research is expected to examine the impact of the Deep Squat position on other more complex variables related to the labor process.

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