Effect of Upright Versus Recumbent Positions on Fetomaternal Outcomes during the Active Phase of Labor among Primiparae

Asmaa Anwar Abd el-glil [(1)], Hala Nouh Ibrahim [(2)], Hanan Abd-Elrahman Kandeel [(3)]

(1) Assistant Professor of Obstetrics and Gynecological Health Nursing, Faculty of Nursing, Kafrelsheikh University, Egypt.
(2) Lecturer of Obstetrics & Gynecologic Nursing, Faculty of Nursing, Alexandria University, Egypt.
(3) Assistant Professor of Obstetrics & Gynecologic Nursing, Faculty of Nursing, Alexandria University, Egypt.
Corresponding author: Asmaa Anwar Abd el-glil
asmanour75@yahoo.com

Abstract

Background: Childbirth is a normal physiological event. It holds profound significance for women emotionally and physically. The current study **aimed** to determine the effect of upright versus recumbent positions on fetomaternal outcomes during active phase of labor among primiparae. **Methodology:** a quasi-experimental research design was used at the labor unit of El-Shatby Maternity Hospital located in Alexandria, Egypt. **A convenience sample of 80** primiparous women in the first stage of labor was categorized into upright and recumbent groups. Data was collected through the utilization of a Basic Structured Interview Schedule, Partograph tool, a Pain Intensity visual analog scale, cardiotocography and a maternal satisfaction questionnaire regarding the labor position. **Results:** there were notable statistical differences between the upright and recumbent groups, with a preference towards the upright group. These differences were observed following variations in positioning in relation to fetal heartrate, fetal head descent, cervical dilatation, effacement, frequency and duration of contractions, intervals, the magnitude of uterine contractions and length of labor, Furthermore, the upright group showed a higher satisfaction score than recumbent group ($p < 0.001$*) **Conclusion**: The study's findings highlight the positive impact of upright positions on the feto-maternal outcomes. This positive impact was achieved in terms of enhancing cervical dilatation, fetal had descent, uterine contractions, shortening the length of labor and increasing maternal satisfaction with childbirth. **Recommendations**: Raise pregnant women's awareness of assuming upright positions during active phase of labor, by offering antenatal education classes in the third trimester.

Keywords: Upright position, Recumbent position, Fetomaternal Outcomes, Active phase of labor, Primiparae

Introduction

Childbirth is a customary physiological occurrence defined by a progressive, and cohesive sequence of alterations within the birth canal, ultimately resulting in the expulsion of the fetus and placenta. But it holds profound significance for women, both emotionally and physically. The quality of care during labor significantly influences their experience, with appropriate management being crucial for the normal progression of labor **(Khresheh et al., 2019).** Conversely, mismanagement can lead to complications such as labor dystocia or prolonged labor, resulting in maternal fatigue, ruptured uterus, and postpartum bleeding and infection **(Dwiarini et al., 2022)**.

Dystocia, which means labor that is difficult, characterized by an abnormally slow advancement of labor stages and is a leading cause of primary cesarean delivery worldwide. Labor dystocia accounts for about 50.3% of all cesarean sections in nulliparous and the majority of repeat cesareans during labor. Labor dystocia, a term denoting dysfunctional and difficult childbirth, is a prevalent issue with grave ramifications, including maternal mortality, especially in developing nations. As a part of labor dystocia, obstructed labor affects about 6 million women worldwide and accounts for 8% (or 42,000) of all maternal deaths each year, the majority of which take place in underdeveloped nations. **(Nahaee et al., 2020 ;Tamanna et al., 2023).**

Earlier detecting and preventing deviations from normalcy are critical in reducing the occurrence of such complications. This underscores the pivotal role healthcare professionals play in ensuring safe and positive childbirth experiences. Maternity nurses play a crucial role in supporting laboring women,

particularly primiparous mothers, by minimizing pain and stress. Facilitating a relaxed, comfortable position can promote normal delivery and potentially decrease the necessity for augmentation or induction. This proactive approach emphasis on the importance of attentive and supportive care during labor, ultimately contributing to better birth outcomes **(Watson & Cooke, 2018)**.

The American College of Obstetricians and Gynecologists (ACOG), 2019 emphasizes that adjusting positions during labor generally offers benefits and poses minimal risk for women with uncomplicated pregnancies as well as the fetus **(American College of Obstetricians and Gynecologists (ACOG), 2019).** The positioning of the mother in the initial Phase in the childbirth process significantly impacts various aspects related to childbirth. According to **Abdolahian et al. (2014)**, these positions influence the unborn baby, the delivery passage, uterine contractions, as well as psychological factors. Parturient can assume a variety of postural positions, which can be broadly classified into two main categories: upright and recumbent. The upright positions include standing, sitting, kneeling, squatting, walking, and The quadruped position. The recumbent positions, on the other hand, encompass lateral, supine, and semi-recumbent postures **(Al Aryani et al., 2022).**

Recumbent positioning, such as dorsal-recumbent, or, supine, is commonly adopted during the first stage of labor to facilitate monitoring and procedural tasks. This approach allows midwives to perform abdominal examinations for evaluating uterine contractions, conduct vaginal examinations for assessing labor progression, and check the fetal head position and heart rate **(Mselle & Eustace, 2020).** Nonetheless, the supine position can compress the major abdominal blood vessels along the spinal column, which may disrupt blood flow to the uterus and placenta, potentially leading to fetal distress. Additionally, this compression can affect the large veins responsible for returning blood to the heart, which may cause hypotension and increase the risk of postpartum hemorrhage **(Yadav et al., 2021).**

The upright position has been shown to enhance uterine contractions, improve the alignment of the birth canal, and increase the mother's cardiac output, which typically rises during labor and supports optimal fetal circulation. By altering maternal positions during labor, it is possible to modify the pelvic dimensions, which not only facilitates the correct alignment of the baby's head in the dilatation stage of delivery but also supports the fetus's rotation and descent in the second stage. Furthermore, such positional variations are associated with a reduced likelihood of cesarean deliveries and a decrease in both maternal and neonatal complications **(Rao et al., 2020; Khresheh et al., 2023).** As highlighted by **World Health Organization (WHO) (2018) and American College of Obstetricians and Gynecologists (ACOG) (2019),** adopting upright positions during the first stage of labor is a long-established, effective, and non-pharmacological method for pain relief that promotes women's control and empowerment during childbirth, thereby enhancing the overall birth experience.

Significance of the study

One of the main explanations why infants and mothers die is prolonged labor. Ineffective uterine contractions, the fetus's presentation or position, or anomalies in the mother's soft tissues are among the factors that contribute to protracted labor. These factors can cause labor to fail to advance and raise the risk of Caesarean section delivery. Departures from normalcy must be identified early on and prevented in order to decrease the likelihood of such consequences **(Mtatina et al., 2022)**. Hence, assuming upright positions will promote more powerful and effective contractions, during which gravity will act to maintain the baby's head pressed against the lower uterine segment, assisting in cervical dilation and reducing the length of labor **(Zang et al., 2022).** Regretfully, while selecting the proper positions for a woman in labor is a crucial aspect of midwifery practice, it is occasionally disregarded in a variety of healthcare settings. According to a study by **Imaniar et al. (2023)** among women in labor, there was a significant difference in the length of the active phase of the first stage of labor between upright posture and supine position, as well as a higher reduction in the pain intensity. Therefore, the purpose of this study was to determine the effect of upright versus recumbent positions on fetomaternal outcomes during active phase of labor among primiparae.

Aim of the study:

Determine the effect of upright versus recumbent positions during active phase of labor on feto-maternal outcomes among primiparae.

Hypotheses of the study:

- **Hypothesis 1:** Primiparous women who assume upright positions during the active phase of labor display more favorable maternal outcomes compared to those who assume recumbent positions.
- **Hypothesis 2:** Primiparous women who assume recumbent positions during the active phase of labor display more favorable fetal outcomes compared to those who assume upright positions.

Operational definition

Fetomaternal outcomes:

The Fetomaternal outcomes observed in this research encompass **fetal outcome** which refer to (fetal heart rate and fetal head descent) while **maternal outcome** refers to (uterine contractions, degree of cervical dilatation, length of labor as well as mode of delivery).

Subjects and Method

Research design:

Quasi-experimental research design (pre and post-test non-equivalent control group design) was adopted, where the effect of the independent variable (upright and recumbent positions) on the dependent variable (fetomaternal outcomes) was examined in this study.

Study setting:

The research was conducted in the labor and delivery ward of El-Shatby Maternity Hospital in Alexandria. It was selected due to its satisfactory turnover rate, availability of cardiotocography (CTG) to monitor uterine contractions and fetal heart rate.

Study Participants:

A sample of 80 women who were in the active phase of their first labor was conveniently selected from the previously specified setting. Equipped with the following parameters, the power analysis statistical tool EPI-info-7 assessed the sample size: a minimum sample size of 80, a confidence level of 95%, an expected frequency of 50%, an acceptable error of 10%, and a population size of 1300 over a period of three months.

The participants of the study were chosen **based on the following inclusion criteria**: primiparous women with uncomplicated, full-term singleton pregnancies in cephalic presentation, spontaneous labor onset, intact membranes, and cervical dilatation of 4-5 cm. Those with pre-existing medical conditions, obstetric complications, or other pregnancy-related medical conditions necessitating standard interventions were not included in the research.

The participants were randomly allocated into two equivalent groups of forty through a randomized process involving a sealed envelope containing cards specifying either the upright or recumbent positions. Subsequently, they were evenly split into these two groups. The study group included 40 primiparous women who maintained upright positions (such as standing, sitting, kneeling, leaning forward, and squatting) for 20-25 minutes each hour. The control group consisted of 40 primiparous women who stayed in a recumbent side-lying position, adhering to routine hospital care practices.

Tools:

Five tools will be used for data collection.

Tool I: Structured Interview Questionnaire. It entailed 2 parts:

Part 1: Demographic characteristics of the participants, such as age, level of education, occupation, residence and type of family.

Part 2: History of current pregnancy which included: weeks of gestation, number of antenatal visits, mode of delivery and the length of labor.

Tool II: World health organization partograph tool:

It was adopted from **World Health Organization (WHO) (1994)** to monitor the well-being of both the mother and fetus during the active phase of labor. Its core feature is a graph designed to record labor progress, including 3 parts: **Maternal condition** such as vital signs (temperature and blood pressure) and any administered drugs and IV infusions, **Fetal condition** such as fetal heart rate and condition of

membrane and **Progress of labor** as cervical dilation, characteristics of uterine contractions (duration, frequency, and interval) and degree of fetal head descent. **(World Health Organization (WHO), 1994)**.

Tool III: Pain intensity visual analog scale (VAS):

This tool was developed by **Melzac and Katz (1994).** It was used by the researchers for assessing the subjective level of pain and was subsequently revised for its reliability and validity by **Alghadir et al. (2018).** It is a standardized linear scale featuring a horizontal line used for women to estimate their pain subjectively **(Kersten et al., 2014; Alghadir et al., 2018)**.

The total score of the visual analog scale ranges from (0 to 10), representing varying degrees of pain intensity. Zero signifies no pain, while scores between 1 and 3 indicate mild pain, moderate pain falls within the range of 4 to 6, severe pain is represented by scores between 7 and 9 and the highest score of 10 denotes unbearable pain.

Tool IV: Maternal satisfaction and preference with commenced position:

This is a self-reported assessment and consisted of a two-question survey created by the researchers. Each primiparous woman was asked to respond to two questions: Are you satisfied with your position assumed during first stage of labor? Do you prefer this assumed position in the next labor? Their responses were recorded as either yes or no.

Methods

- Approval was granted by the Research Ethics Committee at the Faculty of Nursing, Alexandria University. (Approval : IRB00013620)
- A formal request was made to the relevant authorities of the research setting for permission to conduct the research and collect data following an explanation of the research objective, with endorsement from the Vice-Dean of Graduate Studies at the Faculty of Nursing,

Tools development involved several steps:

- Researchers developed tools after reviewing recent relevant literature.
- Tools (II and III 3) were adopted.
- Validation of the tools was conducted by a jury of 5 experts in the related field, considering their suggestions and recommendations.
- The reliability of the instruments was evaluated by means of internal consistency assessments, particularly by employing Cronbach's α. The obtained reliability coefficients were 0.790 and 0.866 for tools II, and III correspondingly.
- A pilot study was conducted on 10% of the sample (8 parturient) to ensure clarity and applicability of the tools, identify any obstacles or problems encountered, and estimate the time required for data collection. Necessary modifications were made based on the pilot study findings. Women participating in the pilot study were excluded from the main study sample.

Ethical Considerations:

Subjects were provided with comprehensive explanations of the research's purpose and asked to give written informed consent. Measures were taken to safeguard the privacy of participants and maintain the confidentiality of collected data.

Participants were explicitly informed that their involvement in the study was voluntary and that they had the right to withdraw at any time without facing any consequences. This ensured that their autonomy and freedom of choice were respected throughout the research process.

Filed Work:

Data were collected over a period of 8 months from December 2023 to July 2024.

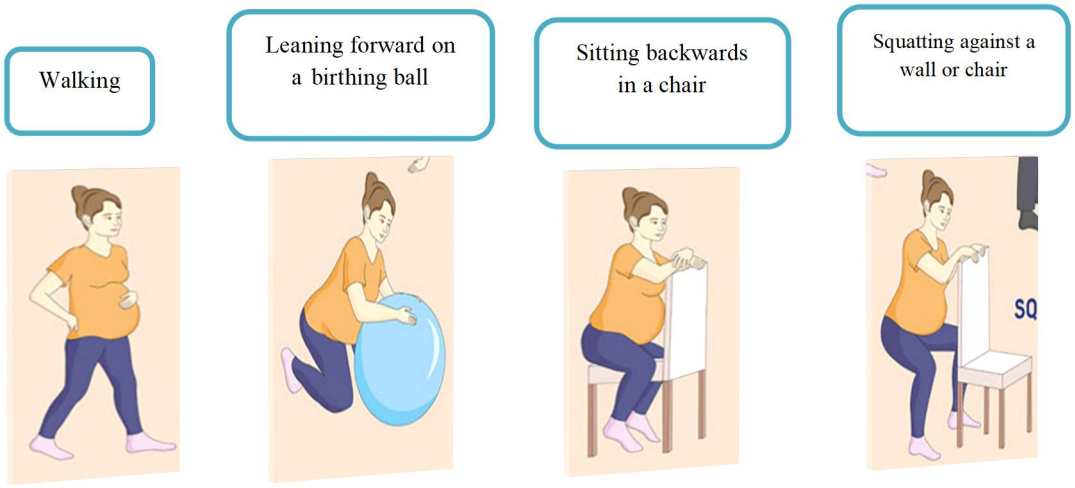
Assessment phase:

All primiparous women in the latent stage of labor who met the sampling inclusion criteria were selected and allocated to either the study (upright positions) or control groups (recumbent position) after that, the researcher’s utilized tool (I) to assess socio demographic data and history of current pregnancy of the participants. At the beginning of the active phase of labor the researcher used tools (II and III) to assess baseline data regarding both maternal and fetal conditions and cervical dilation, uterine contractions (duration, frequency, and intensity), fetal head descent and level of pain.

At the beginning of the interaction, each woman in both groups was greeted by the researchers. The study group received brief, straightforward instructions on maintaining an upright position (such as walking, standing, or sitting, leaning forward on a birthing ball, and squatting against a wall) for a minimum of 20 minutes during the active phase of labor every one hour. Meanwhile, those in the control group remained in the recumbent position and received routine hospital instructions without any intervention.

Implementation phase:

In the study group, each woman was encouraged to alternate between various upright positions, such as walking around the bed, leaning forward on a birthing ball, sitting backwards in a chair, and squatting against a wall or chair, with each position held for 10-15 minutes. Subsequently, she was permitted to lie in bed on her left side and repeat this cycle until cervical dilation (7 cm) was achieved. Conversely, each parturient in the control group assumed the recumbent position as part of routine hospital care and continued in this position until complete cervical dilatation. Women in both groups were instructed to empty their bladders every two hours to promote relaxation.



Anatomystuff.co.uk/active-childbirth-positions-labour-pregnancy-poster.html

https://ar.inspiredpencil.com/pictures-2023/dorsal-recumbent-position

Evaluation phase:

During the active phase, progress of labor including uterine contractions, were checked every half hour, and every 15 minutes during the transitional phase ,cervical dilatation and decent of fetal head was assessed every hour until complete cervical dilation. Fetal heart rate was tracked every 30 minutes. Progress of labor was monitored by using **Tool (II)**. Pain intensity, was monitored hourly using **Tool (III)**. Additionally, parameters such as length of labor, mode of delivery was measured by **(tool I part 2)** and maternal satisfaction and preference with commenced positions were recorded by using **Tool (IV).**

Results:

Table I: Elaborates distribution of primiparous women in the upright and recumbent position groups according to their socio- demographic characteristics. It was noticed that the upright group has a slightly higher percentage of participants aged 25-30 compared to the recumbent group. Additionally, the mean age in the study group (26.08 years) was slightly higher than that in the control group. Both groups exhibited similar distributions across different levels of education, with approximately half (45% &42.5%) of participants in both groups had completed high school respectively. There was a slightly higher percentage of participants who reside in in rural areas compared to the control group (57.5%& 47.5%) respectively. Notably, no statistically significant differences were observed between the two groups regarding age, level of education, residence and family type where p = (0.098, 0.825, 0.370 &0.823 respectively).

Table II: Demonstrates distribution of primiparous women in the upright and recumbent position groups according to their current pregnancy history. 60% of the recumbent group, as compared to 52.5% of the upright group, had 37-38 weeks of gestational age. Regarding the follow up of pregnancy It was observed that an equal proportion (35%) of the two groups had four antenatal visits.

Figure 1: Represents distribution of primiparous women in upright and recumbent position groups according to mode of delivery. The findings indicates that less than one half (47.5%) of the study group had normal vaginal delivery with episiotomy compared to the majority (87.5%) of the control group. Notably, a statistically significant difference was observed between the two groups regarding the mode of delivery where p = (<0.001).

Figure 2: Exhibits distribution of primiparous women in upright and recumbent position groups according to the length of labor. It was evident that a statistically significant differences were found among both groups in relation to duration in transitional phase, second and third stage of labor as p = (0.001, <0.001, <0.001) respectively which means that women in upright groups tended to have more progress of labor than recumbent group.

Table III: Clarifies distribution of primiparous women in upright and recumbent position groups according to the mean of uterine contraction. At baseline, there were no significant differences in the duration, intensity, interval, frequency of uterine contraction. However, after assuming an upright position, significant differences were observed in the 3rd and 4th hours, with the study group showing higher mean durations compared to the control group ($p < 0.001$*). Regarding the intensity of uterine contractions, there were no participants with mild or severe contractions during the first two hours. However, in the 3rd and 4th hours, significant differences were noted, with the study group exhibiting predominantly severe contractions, while the control group mainly had moderate contractions ($p < 0.001$). Additionally, significant differences were observed in the intervals between contractions and their frequency during the 3rd and 4th hours ($p < 0.001$).

Figure 3: Represents distribution of primiparous women in upright and recumbent position groups according to the intensity of uterine contractions. Before assuming different positions at base line, it was noticed that the entire (100%) of upright and recumbent group exhibited moderate uterine contraction. However, after assuming different position marked increase in the intensity of uterine among upright group at the third and fourth hour was observed as the entire 100% of the upright group exhibited strong uterine

contraction compared to (0% & 47.5%) of the control group respectively. Furthermore, there was a statistically significant differences between both groups in relation to uterine contraction intensity after 3rd and 4th hours ($p < 0.001$).

Table IV: Denotes distribution of primiparous women in the upright and recumbent position groups according to the mean cervical dilatation (cm), effacement and condition of membrane. It reveals that there were no significant differences in cervical dilatation, effacement, and condition of membrane between the two groups at baseline. However significant differences were observed in cervical dilatation & effacement the 3rd and 4th hours after assuming different positions with the study group showing higher mean values compared to the control group ($p <0.001$*), Additionally, the integrity of membranes showed significant differences between the two groups at the 3rd and 4th hours, with more intact membranes in the control group ($p <0.001$*).

Table V: Illustrates comparison between the upright and recumbent position group according to the mean of descent of fetal head fifth and Fetal heart rate. Whereas no significant differences were found in descent of fetal head and fetal heart rate between the two groups at baseline. Meanwhile, a statistically significant differences were observed in the 3rd and 4th hrs after assuming different positions with the study group showing lower mean values (126.3±7.82& 129.88±6.55) compared to the control group ($p <0.001$, <0.001, 0.028 & 0.001, respectively) .

Table VI: Reflects distribution of primiparous women in upright and recumbent position groups according to their satisfaction and preference with commenced positions. Almost all (97.5%) of the study group were satisfied with commenced position compared to more than two fifths 45%of the control group. There was a statistically significant difference between both groups regarding their satisfaction with the maternal commenced positions ($p < 0.001$).

Figure 4: Presents of primiparous women in upright position group according to their preferences with commenced positions. It was noticed that slightly less than two fifths (37.5%) of the study group preferred kneeling and leaning forward using birth ball compared to only one quarter 25% of them who preferred siting and squatting position respectively.

Table I: Distribution of primiparous women in the upright and recumbent position groups according to their socio-demographic characteristics N= 80.

Demographic characteristic	Upright group (n= 40)		Recumbent group (n=40)		χ^2	P
	No.	%	No.	%		
Age						
20-<25	10	25.0%	17	42.5%	2.739	0.098
25-<30	30	75.0%	23	57.5%		
Mean ±SD	**26.08± 2.27**		**25.28± 2.51**		**t=1.495**	**p=0.139**
Level of education						
Illiterate /read and write	6	15.0%	4	10.0%	0.902	0.825
Primary/preparatory school	8	20.0%	8	20.0%		
High school	18	45.0%	17	42.5%		
University/post university	8	20.0%	11	27.5%		
Residence						
Urban	21	52.5%	17	42.5%	0.802	0.370
Rural	19	47.5%	23	57.5%		
Family type						
Nuclear	20	50.0%	19	47.5%	0.05	0.823
Extended	20	50.0%	21	52.5%		

χ^2(P): Chi-Square Test &P for χ^2 Test
F (P): Fisher Exact test &P for F Test
*: Significant at P ≤0.05.

Table II: Distribution of primiparous women in the upright and recumbent position groups according to their current pregnancy history.

Current pregnancy history	Upright group (n= 40)		Recumbent group (n=40)		χ^2	P
	No.	%	No.	%		
Weeks of gestation						
37-38 weeks	21	52.5%	24	60.0%	0.457	0.499
39-40 weeks	19	47.5%	16	40.0%		
No. of antenatal visits						
More than 4 times	13	32.5%	11	27.5%	0.31	0.857
4 times	14	35.0%	14	35.0%		

χ^2(P): Chi-Square Test &P for χ^2 Test
F (P): Fisher Exact test &P for F Test
*: Significant at P ≤0.05

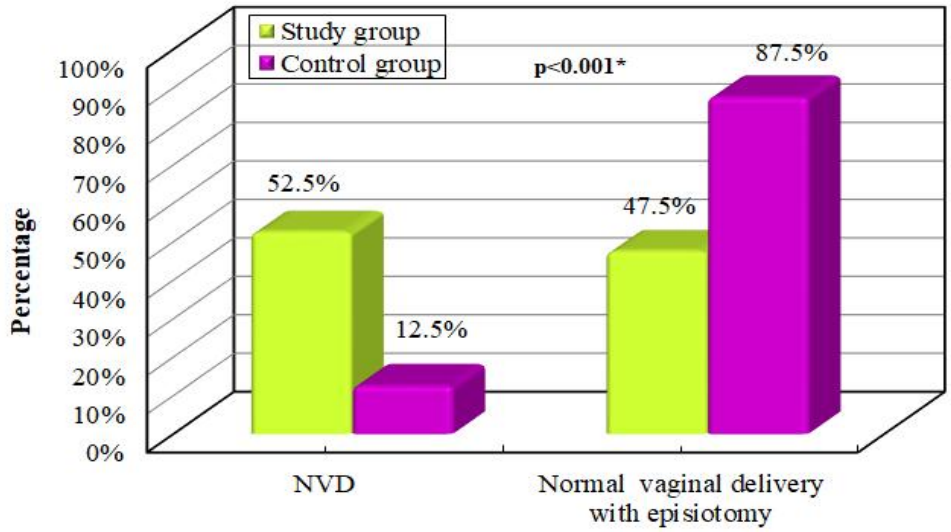


Figure 1: Distribution of primiparous in upright and recumbent groups according to mode of delivery

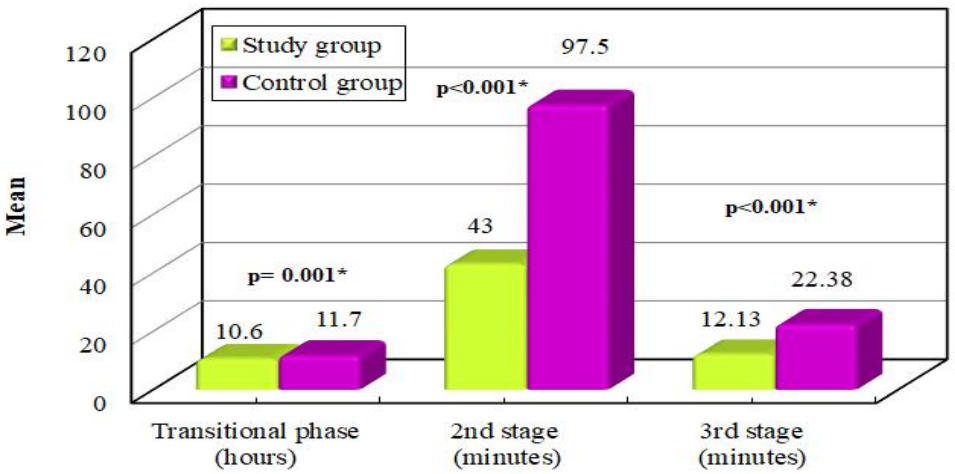


Figure 2: Distribution of primiparous women in upright and recumbent position groups according to the length of labor

Table III: Distribution primiparous women in upright and recumbent position groups according to the mean of uterine contraction.

Uterine contraction		Upright group (n= 40)	Recumbent group (n=40)	Test of sig.	P
		Mean ±SD	Mean ±SD		
Duration	Baseline	22.38 ± 0.60	22.40 ± 0.49		
	1st hour	45.00 ± 0.00	45.00±0.00	-	-
	2nd hour	55.00 ± 0.00	50.00±0.00	-	-
	3rd hour	60.00 ± 0.00	58.13±2.45	**4.837***	**<0.001***
	4th hour	70.00 ± 0.00	63.11±2.5	**17.737***	**<0.001***
Interval	Baseline	35.0 ± 0.0	40.0±0.0	-	-
	1st hour	30.00 ± 0.00	35.00±0.00	-	-
	2nd hour	25.00 ± 0.00	30.00±0.00	-	-
	3rd hour	20.00 ± 0.00	32.88±2.50	**t=19.87***	**<0.001***
	4th hour	15.00 ± 0.00	24.1±3.40	**t=16.287***	**<0.001***
Frequency	Baseline	1.65 ± 0.48	1.68±0.47	**0.234**	**0.816**
	1st hour	2.00 ± 0.00	1.00±0.00	-	-
	2nd hour	2.00 ± 0.00	2.00±0.00	-	-
	3rd hour	3.55 ± 0.51	2.00±0.00	**t=19.457***	**<0.001***
	4th hour	3.95 ± 0.22	3.00±0.00	**t= 27.221***	**<0.001***

χ^2: Chi square test t: Student t-test
*: Statistically significant at $p \leq 0.05$

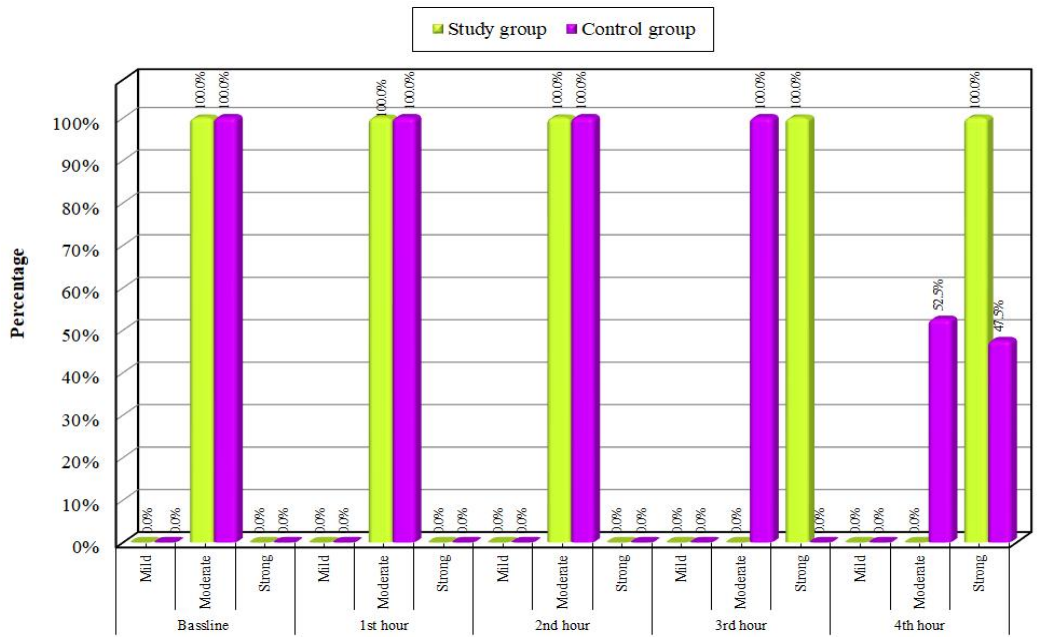


Figure 3: Distribution of primiparous women in the upright and recumbent position groups according to the intensity of uterine contractions.

Table IV: Distribution of primiparous women in upright and recumbent position groups according to mean cervical dilatation (cm), effacement and condition of membrane.

Maternal Outcomes		Upright group (n= 40)		Recumbent group (n=40)		Test of sig.	P
		Mean ±SD		Mean ±SD			
Cervical dilatation (cm)	Baseline	3.40 ± 0.50		3.48 ± 0.51		**0.670**	**0.50**
	1st hour	4.00 ± 0.00		4.00 ± 0.00		-	-
	2nd hour	5.00 ± 0.00		4.84 ± 0.24		-	-
	3rd hour	6.00 ± 0.00		5.66 ± 0.24		**t=4.333***	**<0.001***
	4th hour	7.00 ± 0.00		6.50 ± 0.00		**t=9.000***	**<0.001***
Effacement (%)	Baseline	15.25 ± 5.1		15.0 ± 5.0		**0.221**	**0.826**
	1st hour	20.00 ± 0.00		20.00 ± 0.00		-	-
	2nd hour	40.00 ± 0.00		30.00 ± 0.00		-	-
	3rd hour	60.00 ± 0.00		34.5 ± 5.0		**32.010***	**<0.001***
	4th hour	80.00 ± 0.00		39.0 ± 10.1		**25.733***	**<0.001***
Condition of Membrane	**Baseline**	**No**	**%**	**No**	**%**		
	Intact	40	100.0%	40	100.0%		
	1st hour						
	Intact	40	100.0%	40	100.0%		
	2nd hour						
	Intact	40	100.0%	40	100.0%		
	3rd hour						
	Intact	40	100.0%	26	65.0%	$\chi 2$= **16.970***	**<0.001***
	Membrane rupture with clear amniotic fluid	0	0.0%	14	35.0%		
	4th hour						
	Intact	0	0.0%	40	100.0%	χ^2=**80.000***	**<0.001***
	Membrane rupture with clear amniotic fluid	40	100.0%	0	0.0%		

χ^2: Chi square test
t: Student t-test for comparing the two groups
*: Statistically significant at $p \leq 0.05$

Table V: Distribution of primiparous women in upright and recumbent position groups according to mean the descent of fetal head fifth & mean Fetal heart rate

Fetal outcome		Upright group (n= 40)	Recumbent group (n=40)	T	P
		Mean ±SD	Mean ± SD		
Descent of fetal / head fifth	Baseline	4.75 ± 0.44	4.58 ± 0.50	**1.663**	**0.100**
	1st hour	4.00 ± 0.00	5.00 ± 0.00	-	-
	2nd hour	4.00 ± 0.00	4.00 ± 0.00	-	-
	3rd hour	3.00 ± 0.00	4.25 ± 0.44	**18.028***	**<0.001***
	4th hour	2.00 ± 0.00	3.30 ± 0.46	**17.716***	**<0.001***
Fetal heart rate	Bassline	140.4 ± 6.6	137.9 ± 9.1	**1.409**	**0.163**
	1st hour	132.00 6.28	129.88 6.55	**1.480**	**0.143**
	2nd hour	130.25 6.30	131.50 6.43	**0.879**	**0.382**
	3rd hour	126.3 ± 7.82	129.88 6.55	**2.247***	**0.028***
	4th hour	125.13 ± 6.4	131.50 6.43	**4.328***	**0.001***

t: Student t-test for comparing the two groups.
*: Statistically significant at $p \leq 0.05$

Table VI: Distribution of primiparous women in upright and recumbent position groups according to their satisfaction and preference with commenced positions.

Maternal satisfaction	Upright group (n= 40)		Recumbent group (n=40)		Test of sig.	P
	No.	%	No.	%		
Maternal satisfaction with commenced position						
Yes	39	97.5%	18	45.0%	χ^2= **26.911***	FEp **<0.001***
No	1	2.5%	22	55.0%		
Preference with the maternal commenced position in next delivery						
Yes	40	100.0%	12	30.0%	χ^2= **43.077***	FEp **<0.001***
No	0	0.0%	28	70.0%		

χ^2: Chi square test FE: Fisher Exact
t: Student t-test *: Statistically significant at $p \leq 0.05$

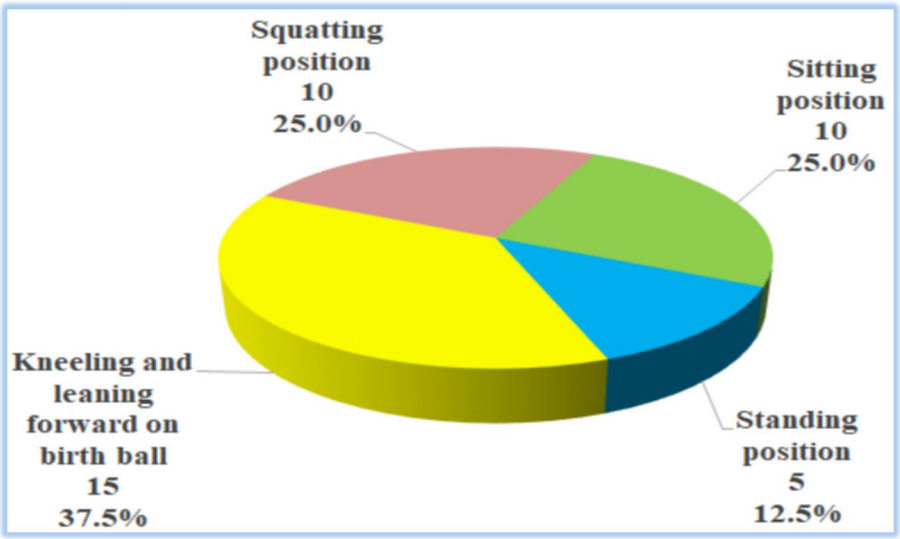


Figure 4: Distribution of primiparous in upright positions group according to their preferences with commenced positions

Discussion

Maternal positioning affects the biomechanics and physiologic adaptions to labor. Recent research has explored the biomechanical effects of different birth positions, focusing on how they influence pelvic dimensions, intrauterine pressure, fetal head molding, and the angle of the fetal head as it moves through the birth canal. Choosing the right maternal position during labor is an important part of midwifery care, yet it is sometimes overlooked by healthcare providers. **Zang et al. (2020)**. Evidence-based maternity care focuses on practices that increase maternal and newborn safety. The aim of this study is to determine the effect of upright versus recumbent positions during active phase of labor on fetomaternal outcomes among primiparae. The study found that, primiparous women in upright positions, during the active phase of labor showed marked improvements in uterine contractions, fetal head descent and cervical dilation, along with shorter first and second stages of labor—without any negative impact on fetal outcomes compared to those who adopted recumbent positions. These findings supported the study's hypotheses that: H1 Primiparous women who assume upright positions during the active phase of labor display more favorable maternal outcomes

compared to those who assume recumbent positions.

H2 Primiparous women who assume recumbent positions during the active phase of labor display more favorable fetal outcomes compared to those who assume upright positions.

The current study's findings demonstrated that less than one half of the upright position group had normal vaginal delivery with episiotomy compare to the majority of the recumbent position group. These findings are congruent with a quasi-experimental study by **Al Aryani et al. (2022)**, which reported that the majority of women in the upright position group had a normal vaginal delivery, compared to only about one-quarter of those in the control group. On the other hand, a study by **Ibrahim et al. (2020)** found no significant difference between women assigned to upright versus recumbent positions for the mode of delivery.

The current study found a notable reduction in the duration of both the transitional and second stages of labor among women in the upright position group, with an average time of 43.0±16.67 minutes. These results align with findings from **Rizki and Windarti (2021),** who observed that the second stage of labor was significantly shorter in women using upright positions compared to those in a recumbent position—averaging 11.3 minutes versus 19.7 minutes, respectively, with a statistically significant p-value of 0.009. Similarly, a more recent study by **Rani et al. (2025)** supported these findings, showing that upright positions during the first stage of labor not only reduced overall labor duration but also lowered the risk of perineal tears. This could be because upright positions allow the pelvis and fetus to align more naturally with the force of gravity, making the birthing process more efficient and comfortable.

Additionally, squatting has been found to further support labor progress by easing discomfort, helping the baby's descent, and widening the lower pelvis by approximately 28%, which also increases the instinctive urge to push **Berta et al. (2019).** Complementing these findings, a randomized controlled trial by **Oktafiani et al. (2021)** highlighted the benefits of letting women move freely during labor, particularly with the use of birth balls. These tools support better pelvic positioning and fetal descent, improving mobility throughout labor. A possible explanation lies in the gate control theory of pain, which suggests that non-painful sensations—like the gentle pressure from a birth ball—can help block or reduce pain signals sent to the brain. In other words, these soothing sensations help "close the gate" on pain at the level of the spinal cord, making labor more tolerable. Birth balls, with their soft, flexible surface, offer comfort and light massage to the lower back and perineum, easing pressure and helping women manage labor pain more naturally.

When it came to uterine contractions assessed in the two studied groups, the current study's findings showed that statistically significant variations in duration, frequency and reducing the interval between uterine contractions over 3rd &4th hours compared with the recumbent position group in the active first stage of labour. Similarly, a quasi-experimental study in Saudi Arabia **by Al Aryani et al. (2022)** examined the effects of upright and recumbent positions on labor outcomes. They found that the average duration of uterine contractions was significantly longer in the experimental group compared to the comparison group. The results of the present study also align with those of an Egyptian study by **Ibrahim et al. (2020)**, which reported significant post-intervention differences ($P < 0.05$) between the study and control groups in the interval, intensity, and frequency of uterine contractions. Likewise, **Emam and Al-Zahrani (2018)** in Egypt highlighted the positive impact of the upright position on the progress of childbirth.

The consistency between the present study and the previously mentioned research can be explained by the role of gravity. Upright positions help reduce aortocaval compression, which can enhance the strength of the uterine muscles. They also encourage the fetal head to descend into the pelvis and increase pelvic dimensions, all of which support the progress and effectiveness of uterine contractions. According to the current study's findings, there was a highly statistically significant difference between upright position group related to cervical dilatation, effacement and descent of fetal head fifth in the active phase of labour (p

< 0.001*). These findings are consistent with the results of **Feyeah and Yakout (2022) and Zaky (2016). Feyeah and Yakout (2022)** reported improved cervical dilation within the first four hours of adopting the sitting position, while **Zaky (2016)** observed significant progress in both fetal head descent and cervical dilation in the experimental group that performed pelvic rocking exercises in a sitting position during the active phase of the first stage of labor, compared to the control group.

This effect can be understood by how upright positions harness gravity to encourage the fetal head's descent and widen the pelvic space, giving the baby more room to move downward and rotate. This increased direct pressure of the fetal head on the cervix helps speed up cervical dilation and supports the overall progress of labor **Walker et al. (2018).** Additionally, from the researcher's perspective, upright positions during the active phase of labor allow the abdominal wall to relax, enabling gravity to draw the uterine fundus forward. Regarding fetal head descent, this may also be due to the way upright positions strengthen the pelvic muscles and increase pelvic capacity, thereby facilitating smoother and more.

Concerning fetal heart rate, A statistically significant differences were observed in the 3rd and 4th hours p= 0.028* & p=0.001* respectively in upright group. This result came hand to hand with **Abo-Hatab et al. (2020).** They found that cardiotocography readings showed a significant drop in the mean fetal heart rate among women in the supine group, whereas those in the semi-sitting and left lateral groups had a significant increase - remaining within the normal range - at the 1st, 2nd, 3rd, and 4th hours after adopting their respective positions. Moreover, the present study was compatible with **Stone et al. (2017)** they examined the (effect of maternal position on fetal behavioral state and heart rate variability in healthy late gestation). They illustrated that there was evident relation between maternal position and the mean fetal heart rate where the mean fetal heart rate reduced among the supine group.

The agreement between the current study and previous research is further supported by the literature, which notes that the supine position can cause aortocaval compression syndrome. In this condition, the gravid uterus presses on the abdominal aorta and inferior vena cava, reducing blood flow to the uterus, decreasing placental perfusion, limiting fetal oxygen supply, and ultimately lowering the fetal heart rate. In contrast, the left lateral position is highly beneficial for fetal wellbeing, as it relieves pressure on the umbilical cord, enhances fetal circulation, improves oxygenation, and helps maintain a normal heart rate. Similarly, the semi-sitting position supports better oxygen delivery to the fetus and contributes to improved fetal heart rate **(Lee & Landau, 2017; Fujita et al., 2019).**

Recently, the importance of women's satisfaction with maternity services has become more significant in the eyes of healthcare professionals in relation to the care that women received during labour and delivery **(Al-Seady et al., 2017)**. According to the study's findings, there was a statistically significant difference between both groups regarding their satisfaction with the maternal commenced positions with preferred kneeling and leaning forward using birth ball compared to siting and squatting positions.

In the same line the study done by **Sönmez and Apay (2023)** illustrated that that the control group had lower levels of satisfaction and the spherical ball group had high levels of satisfaction. Also, The current study agrees with a previous study in Saudi Arabia **Al Aryani et al. (2022)** who stated that the mean score satisfaction with the assuming upright position was higher among the experimental group than among the comparison group, reflecting a statistically significant difference. The mean score for preferring the same upright position in future childbirth was notably higher in the experimental group compared to the comparison group. Similarly, **Huang et al. (2019) and Emam and Al-Zahrani (2018)** found that adopting an upright posture during the first stage of labor is a safe and well-accepted option for women. They also reported a highly significant difference in maternal satisfaction and willingness to choose the upright position again in subsequent labors.

Conclusion

The current study's findings highlight the positive impact of upright positions on the feto-maternal outcomes among primiparous women

in the active phase of labour. This positive impact attained in terms of improving childbirth progress, enhancing uterine contractions frequency duration, fetal had descent and cervical dilatation. It also shortens the duration of labor - particularly the transitional phase, second stage, and third stage - without causing any negative effects on maternal or fetal outcomes, while enhancing maternal satisfaction with the childbirth experience.

Recommendations

Based on current study's findings, the following are recommended:

- Raise pregnant women's awareness of assuming upright positions during active phase of labor, by offering antenatal education classes in the third trimester.
- Offer ongoing training programs for maternity nurses in labor units to emphasize the importance and benefits of encouraging position changes during the active phase of labor.
- Apply upright positions during active phase of labor as a routine care in the labour and delivery unit.
- Expand the study's generalizability by conducting it in a range of settings and with larger sample sizes.

Reference

Abdolahian, S., Ghavi, F., Abdollahifard, S. and Sheikhan, F. (2014): Effect of dance labor on the management of active phase labor pain & clients' satisfaction: a randomized controlled trial study. Global journal of health science, Vol.(6), No.(3), Pp.219-226.

Abo-Hatab, T., Ahmed, M., Abozeid, E., Gaheen, M., and El-adham, A. (2020): Effect of Various Maternal Positions on Labor Pain and Fetal Heart Rate duringthe First Stage of Labor. positions, Vol.(11), Pp.12.

Al-Seady, M., Fadel, E., El-Gohary, A. and Marzouk, T. (2017): Labour pain and satisfaction of primipara assume upright versus recumbent positions during first stage of labour. IOSR J Nurs Health Sci, Vol.(6), No.(4), Pp.24-30.

Al Aryani, Z., Orabi, A. and Fouly, H. (2022): Examining the impact of upright and recumbent positions on labor outcomes in Saudi Arabia: A quasi-experiment. Belitung nursing journal, Vol.(8), No.(4), Pp.316-324.

Alghadir, A., AnwerS., Iqbal A. and Iqbal Z.,(2018): Test-retest reliability, validity, and minimum detectable change of visual analog, numerical rating, and verbal rating scales for measurement of osteoarthritic knee pain. Journal of pain research, Vol.(11), Pp.851-856.

American College of Obstetricians and Gynecologists (ACOG) (2019): ACOG Committee Opinion No. 766: Approaches to Limit Intervention During Labor and Birth. Obstetrics and gynecology, Vol.(133), No.(2), Pp.e164-e173.

Berta, M., Lindgren, H., Christensson, K., Mekonnen, S. and Adefris, M. (2019): Effect of maternal birth positions on duration of second stage of labor: systematic review and meta-analysis. BMC Pregnancy Childbirth, Vol.(19), No.(1), Pp.466.

Dwiarini, M., Chou, H. F., Gau, M. L. and Liu, C. Y. (2022): Relationship between fear of childbirth, self-efficacy, and length of labor among nulliparous women in Indonesia. Midwifery, Vol.(105), Pp.103203.

Emam, A. and Al-Zahrani, A. E. (2018): Upright versus recumbent position during first stage of labor among primipara women on labor outcomes. Journal of Nursing Education and Practice, Vol.(8), No.(7), Pp.113-124.

Feyeah T., and Yakout, S. M. (2022): The Influence of Three Delivery Positions on Pain Intensity and Feto-Maternal Outcomes During The First Stage of Labor among primi-gravidae Mothers, Comparative Study. Assiut Scientific Nursing Journal, Vol.(10), No.(29), Pp.196-210.

Fujita N., Higuchi H., Sakuma S., Takagi S., Latif M. and Ozaki M. (2019): Effect of Right-Lateral Versus Left-Lateral Tilt Position on Compression of the Inferior Vena Cava in Pregnant Women Determined by

Magnetic Resonance Imaging. Anesthesia and analgesia, Vol.(128), No.(6), Pp.1217-1222.

Huang, J., Zang, Y., Ren, L. H., Li, F. J. and Lu, H. (2019): A review and comparison of common maternal positions during the second-stage of labor. International journal of nursing sciences, Vol.(6), No.(4), Pp.460-467.

Ibrahim, H. A.-F., Said, H. I. I. and Elgzar, W. T. I. (2020): Effect of upright and ambulant positions versus lying down during the active first stage of labor on birth outcomes among nulliparous women: randomized controlled clinical trial. Frontiers of Nursing, Vol.(7), No.(3), Pp.239-248.

Imaniar, M. S., Nurhikmah, T. S., Laksmining, S. and Rahmatul, S. (2023): Effect of Upright Position on Pain and Duration of the Active Phase of the First Stage of Labor among Women in Labor in the Work Area of Tasikmalaya TPMB. EMBRIO: Jurnal Kebidanan, Vol.(15), No.(1), Pp.21-27.

Kersten, P., White P. , and Tennant, A. (2014): Is the pain visual analogue scale linear and responsive to change? An exploration using Rasch analysis. PloS one, Vol.(9), No.(6), Pp.e99485.

Khresheh, R., Barclay, L. and Shoqirat, N. (2019): Caring behaviours by midwives: Jordanian women's perceptions during childbirth. Midwifery, Vol.(74), Pp.1-5.

Khresheh, R., Mosleh, S., Shoqirat, N., Mahasneh, D. and Barclay, A. L. (2023): Effects of Ambulation during the First Stage of Labor on Maternal and Neonatal Outcomes: A Randomized Controlled Trial. Nursing and Midwifery Studies, Vol.(12), No.(1), Pp.1-6.

Lee, A. J. and Landau, R. (2017): Aortocaval Compression Syndrome: Time to Revisit Certain Dogmas. Anesthesia and analgesia, Vol.(125), No.(6), Pp.1975-1985.

Melzac, R. and Katz, J. (1994): Pain measurement in persons pain, In P. Wall & R. Melzac (Eds.), Textbook of pain. New York: Churchill Livingstone. Pp. 337-351

Mselle, L. T. and Eustace, L. (2020): Why do women assume a supine position when giving birth? The perceptions and experiences of postnatal mothers and nurse-midwives in Tanzania. BMC Pregnancy Childbirth, Vol.(20), No.(1), Pp.36.

Mtatina, A. V., Mselle, L. T., Mwakawanga, D., Sando, D. and Mkoka, D. A. (2022): Maternal and New-Born Outcomes When Using Upright and Supine Birth Positions During Labour and Delivery: A Quasi-Experimental Study. American Journal of Health, Medicine and Nursing Practice, Vol.(7), No.(8), Pp.28-39.

Nahaee, J., Abbas-Alizadeh, F., Mirghafourvand, M. and Mohammad-Alizadeh-Charandabi, S. (2020): Pre- and during- labour predictors of dystocia in active phase of labour: a case-control study. BMC pregnancy and childbirth, Vol.(20), No.(1), Pp.425.

Oktafiani, F., Suciawati, A. and Rukmaini, R. (2021): The effect of the birthing ball on duration of the first stage of labour in primigravida at Utama Barokah Clinic, Bandung City in 2021. Muhammadiyah Medical Journal, Vol.(2), No.(2), Pp.55-61.

Rani, K., Ravi, R. K., Attri, V., Kaur, H., Pareek, B. and Baby, P. (2025): Impact of Upright Position during the First Stage of Labour on Maternal Outcomes: A Randomized Controlled Trial. Reviews on recent clinical trials, Vol.(20), No.(1), Pp.52-58.

Rao, S., Sridharan, S., Vasudeva, A. and PS, R. (2020): Will women's choice of position in first stage of labor affect labor process? International Journal of Reproduction, Contraception, Obstetrics and Gynecology, Vol.(9), No.(4), Pp.1516-1519.

Rizki, L. K. and Windarti, Y. (2021): Differences In The Length Of Labor Stage II On Upright Position and Recumbent Position. STRADA : Jurnal Ilmiah Kesehatan, Vol.(10), No.(1), Pp.120-124.

Sönmez, T. and Apay, S. E. (2023): Effect of different birth balls used at the first stage of labor on birth outcomes and maternal satisfaction: a randomized controlled trial. Clinical and Experimental Health Sciences, Vol.(13), No.(3), Pp.600-607.

Stone, P. R., Burgess, W., McIntyre, J. P., Gunn, A. J., Lear, C. A., Bennet, L., Mitchell, E. A., Thompson, J. M. and Maternal Sleep In Pregnancy Research Group, T. U. o. A. (2017): Effect of maternal position on fetal behavioural state and heart rate variability in healthy late gestation pregnancy. The Journal of physiology, Vol.(595), No.(4), Pp.1213-1221.

Tamanna, Asif, M., Nausheen Khattak, S., Rahat, A., Azeem, T., Ur Rehman, H., Amin, F., & Saeed, K. (2023). Prevalence of Dystocia its Risk Factors and Complications among the Women of District Buner, Pakistan. *Journal of Health and Rehabilitation Research*, *3*(2), 996–1000. https://doi.org/10.61919/jhrr.v3i2.267

Walker, K. F., Kibuka, M., Thornton, J. G. and Jones, N. W. (2018): Maternal position in the second stage of labour for women with epidural anaesthesia. The Cochrane database of systematic reviews, Vol.(11), No.(11), Pp.Cd008070.

Watson, H. L. and Cooke, A. (2018): What influences women's movement and the use of different positions during labour and birth: a systematic review protocol. Systematic reviews, Vol.(7), No.(1), Pp.188.

World Health Organization (WHO) (1994): World Health Organization partograph in management of labour. World Health Organization Maternal Health and Safe Motherhood Programme. Lancet (London, England), Vol.(343), No.(8910), Pp.1399-1404.

World Health Organization (WHO) (2018): Recommendation intrapartum care for a positive child birth experience: The WHO Reproductive Health Library. Geneva: WHO.

Yadav, A., Kamath, A., Mundle, S., Baghel, J., Sharma, C. and Prakash, A. (2021): Exploring the perspective of nursing staff or caregivers on birthing positions in Central India. Journal of family medicine and primary care, Vol.(10), No.(3), Pp.1149-1154.

Zaky, N. H. (2016): Effect of pelvic rocking exercise using sitting position on birth ball during the first stage of labor on its progress. IOSR Journal of Nursing and Health Science, Vol.(5), No.(04), Pp.19-27.

Zang, Y., Fu, L., Zhang, H., Hou, R. and Lu, H. (2022): Practice Programme for Upright Positions in the Second Stage of Labour: The development of a complex intervention based on the Medical Research Council framework. Journal of nursing management, Vol.(30), No.(7), Pp.3608-3617.

Zang, Y., Lu, H., Zhang, H., Huang, J., Ren, L. and Li, C. (2020): Effects of upright positions during the second stage of labour for women without epidural analgesia: A meta-analysis. Journal of advanced nursing, Vol.(76), No.(12), Pp.3293-3306.