

## The Effect of Upright Positions During The First Stage of Labour on Childbirth Types: A Meta-Analysis

### Doğum Eyleminin 1. Evresinde Anneye Uygulanan Dik Pozisyonların Doğum Tipi Üzerine Etkisi: Bir Meta-Analiz Çalışması

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#### Abstract

**Objective:** To assess the effect of the upright positions on childbirth types in woman who did not receive routine epidural analgesia during the first stage of labor

**Methods:** In this meta-analysis, articles, master's theses, and PhD theses published between 1970 and 2015 in 10 databases were reviewed for keywords and inclusion criteria. The bias risks of the studies were assessed according to Cochrane Handbook for Systematic Reviews of Interventions, and the overall effect size analysis, heterogeneity tests, and sensitivity analysis were performed with the publication bias, risk ratio effect size, and random effects model.

**Results:** The criteria for the meta-analysis were met by 13 intervention studies (n=2441). According to the random effect model, the overall effect size of vaginal birth was 1.035 (95% CI=0.961-1.115), that of instrumental vaginal birth was 0.871 (95% CI=0.591-1.285), and that of cesarean birth was 0.625 (95% CI=0.416-0.940). After sensitivity analysis, it revealed that the risk ratio for the cesarean delivery rate was statistically insignificant with 0.602 (95% CI=0.319-1.134), but effect size and the heterogeneity of cesarean delivery effect size were wider.

**Conclusion:** In women who did not receive routine epidural analgesia at the first stage of labor, the effect of the upright position on vaginal and instrumental vaginal births was insignificant; however, the rate of cesarean delivery was less in the upright position. This study should be repeated in the clinical setting with an appropriately designed experimental framework. The methodology of the research subject should be conducted in an appropriately designed experimental work. Women should be encouraged to use the upright position while giving birth because the absence of any harm in the upright position is important in reducing the rate of cesarean birth, but the individual factors of the positions should be taken into consideration.

**Keywords:** Birth, cesarean birth, first stage, nursing, meta-analysis, position

#### Öz

**Amaç:** Doğumun 1. evresinde rutin epidural analjezi almayan annelere uygulanan dik pozisyonların doğum tipi üzerine etkisini belirlemektir.

**Yöntemler:** Çalışmada meta-analiz yöntemi kullanılmıştır. Anahtar kelimeler ve dahil edilme kriterleri doğrultusunda 1970-2015 yıllarında yapılmış araştırmalar toplam 10 veri tabanında taranmıştır. Çalışmaların yanlılık riskleri değerlendirilmiş, yayın yanlılığı, rastgele etkiler modeli ile genel etki büyüklüğü, heterojenite testleri ve duyarlılık analizleri yapılmıştır.

**Bulgular:** Dahil edilme kriterleri doğrultusunda toplam 13 çalışma (n=2441) analize dahil edilmiştir. Rastgele etkiler modeline göre normal doğum oranı genel etki büyüklüğü; 1.035 (% 95 CI=0.961-1.115), müdahaleli doğum oranı 0.871 (% 95 CI=0.591-1.285) ve sezaryen doğum oranı 0.625 (% 95 CI= 0.416-0.940) olarak hesaplanmıştır. Duyarlılık analizi sonucunda sezaryen doğum oranına ait risk oranının 0.602 (%95 CI=0.319-1.134) ile istatistiksel olarak önemsiz düzeyde olduğu, ancak etki büyüklüğü güven aralığının ve heterojenitenin daha geniş olduğu dikkat çekmektedir.

**Sonuç:** Doğumun 1. evresinde rutin epidural analjezi almayan annelerde dik pozisyonun normal doğum, müdahaleli doğum üzerine etkisinin önemsiz, ancak sezaryen doğum oranını azaltmada etkili olduğu saptanmıştır. Araştırmacılara konuya ilişkin metodolojisi uygun bir biçimde planlanmış deneysel çalışmaların yapılması önerilmektedir. Dik pozisyonun herhangi bir zararının saptanmamış olması, sezaryen doğumu azaltmada etkisinin önemli olması nedeni ile annelerin doğumda dik pozisyon kullanımının teşvik edilmesi, ancak pozisyonlara bireysel faktörleri dikkate alarak karar verilmesi önerilmektedir.

**Anahtar kelimeler:** Birinci evre, doğum, hemşirelik, meta-analiz, pozisyon, sezaryen doğum

#### INTRODUCTION

Today, consensus exists that labor is a physiological process and requires minimum medical intervention. Any medical intervention that might be considered elective may exert adverse effects on the labor progress and hormone release (1). However, women are encouraged to mobilize and change their positions while giving spontaneous births (2-6). Nevertheless, women are often unable to move for several reasons, such as failure in understanding the significance of positioning in ameliorating the birth process, senility caused by epidural anesthesia, prejudices against the upright position in labor (common among mothers and health professionals), constant fetal monetarization, analgesic use, and labor medicalization (7-9).

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The upright positions in the first stage of labor include walking, standing, sitting, half sitting, kneeling, and hand and knee positioning (8). Nonpharmacological methods, such as walking and using a birthing ball, help reduce nonconforming situations by shortening labor duration (10). Moving and changing positions as a nonpharmacological method in reducing maternal pain prevent the excessive fear of giving birth and fulfill the psychological and emotional dimensions of care (11). By maintaining the upright position, women can control labor and can have their spouses with them. The positive effects of the upright position increase women's autonomy and ensure a positive labor experience (12). The focus of midwifery/nursing care in labor is to assure a safe birth for mothers and newborns as well as satisfactory and positive labor experience, which also ascertains well-established and strong family bonding (13).

Reportedly, the effects of position in the first stage of labor have already been discussed in randomized controlled trials and meta-analyses. The results of experimental studies have illustrated that the upright position in labor results in less maternal pain; increased uterine contraction quality (10, 14); decreased cesarean birth rates (10, 15), perineal traumas, and episiotomy; and a considerably decreased use of analgesics (16-18). In contrast, some studies have also suggested no statistical difference among study groups in terms of labor duration (19-21) and birth type (19-22).

In a meta-analysis, mothers giving birth in the upright position have fewer cesarean operations [risk ratio (RR)=0.71; 95% CI=0.54–0.94] and lower levels of epidural anesthesia (RR=0.81; 95% CI=0.66–0.99). The upright labor position slightly affects the rates of spontaneous vaginal births and instrumental labor. Conversely, because the results were highly heterogeneous and biased, there remains an urgent need for high-quality studies to discuss risks and benefits of the upright position (23). Lawrence et al. (23) did not include unpublished graduate studies in their reviews, which may have caused publication bias (24).

Meta-analysis is a research method that systematically combines independent studies on similar topics (25). It provides a methodological support to generalize study results (26), to facilitate the finding of sources of heterogeneity of the study results (27), and to evaluate the effects of the same results in different study groups (28). Meta-analysis is seldom performed in nursing studies in Turkey (29).

This meta-analysis primarily aimed to investigate the effects of the upright position on birth types in women who did not receive routine epidural anesthesia in the first stage of labor. The focus of this particular study is to analyze the methodological differences between experimental studies and their effects on the study results. Consequently, earlier concepts were updated by including recent studies, master's theses, and doctoral dissertations.

## METHODS

This study was designed as a meta-analysis, which is a quantitative and descriptive research method, according to recommendations in the *Cochrane Handbook for Systematic Reviews of Interventions* published by Cochrane (30).

### Inclusion Criteria

The studies included in this meta-analysis were selected according to the following criteria:

**1. Sample Group:** The meta-analysis included (a) women who used the upright and recumbent positions in the first stage of labor, (b) women with single fetus and vertex presentations, (c) women who planned vaginal birth, (d) women with no maternal and obstetric complications, (e) primiparous or multiparous women, (f) women who did not receive any type of epidural anesthesia, and (g) women who experienced spontaneous or instrumental labor.

**2. Intervention:** The meta-analysis included studies of mothers who did not receive epidural anesthesia in the first stage of labor and were positioned in the upright position (ambulation, upright position in bed, and birthing ball) as the test group and those who used the recumbent position (supine, supine lithotomy, dorsal, lateral, and bed restriction) as the control group.

**3. Study Results:** Studies on the maternal effects of birth position were included in the meta-analysis. The study results were correlated with birth types [vaginal birth, instrumental birth (forceps or vacuum), and cesarean birth].

**4. Study Type:** The meta-analysis included (a) studies conducted between 1970 and 2015; (b) full-text master's and doctoral theses available on predetermined databases; (c) randomized controlled studies; (d) studies with precise data required for meta-analysis, such as sample size, standard deviation, and average scores of variables both in the test and the study groups; or (e) full-text articles or graduate studies in Turkish or English.

The exclusion criteria were as follows: studies with occiput posterior positions, presentation disorders, maternal and obstetric complications of the fetus, breech delivery, and twin pregnancy; cross-over studies; studies wherein the participants used the recumbent position in the test group; studies with inadequate data of study groups or incomplete sample size data; and studies that included additional medical interventions, in addition to giving positioning instructions.

### Literature Review

The studies were retrieved using certain keywords in Turkish and English, such as "position and first stage of labour" or "maternal position and labour." The review was performed in EBSCOhost, CINAHL Complete, Medline, Science Direct, Springer Link, Ovid, Cochrane Central Register of Controlled Trials, Networked Digital Library of Theses & Dissertations, and Proquest for studies in English. Studies in Turkish were reviewed in ULAKBİM and the YÖK Graduate Studies Database. Some studies were relevant and might have data consistent with the inclusion criteria but were not accessible as full texts. The authors of such studies were contacted to obtain access to their studies. Furthermore, some other researchers were also contacted to clarify the method and data of their studies.

### Assessing Bias Risk

We translated The Cochrane Collaboration tool to assess the risk of bias for each study. The results are summarized in Table 1.

### Data Coding

We coded the studies yielded in the literature review on the basis of a coding protocol. We designed this protocol the researcher, which comprises three sections; study characteristics, study context, and study data. Data coding was performed independently by two researchers, and the interrater agreement was 92.6%.

**Table 1.** Characteristic characteristics of included studies to meta-analysis

Study	Country	Participants	Intervention/ Control Group	Outcomes	Bias Risk	
Mathew et al. (10)	India	Primiparous N=20/20 N=20/20	Birth chair and ambulation versus bed in dorsal or lateral recumbence	Duration of the first and second stages of labor, vaginal birth, instrumental birth, cesarean birth, cervical dilatation rate	Random sequence generation : High Allocation concealment: Uncertain Selective reporting: High	Blinding in application and determination: High/ Uncertain Incomplete outcome data: Uncertain Other bias: High
Flynn et al. (16)	United Kingdom	Primiparous- Multiparous N=34/34	Ambulation versus lateral position (recumbent)	Duration of the first stage of labor, vaginal birth, forceps birth, cesarean birth, induction rate, analgesia requirement rate, contraction frequency rate, contraction time	Random sequence generation : Uncertain Allocation concealment: Uncertain Selective reporting: Low	Blinding in application and determination: High/ Uncertain Incomplete outcome data: Uncertain Other bias: Uncertain
MacLennan et al. (20)	Australia	Primiparous- Multiparous N=96/100	Ambulation versus recumbence	Vaginal, instrumental and cesarean birth, induction ratio, analgesia requirement ratio	Random sequence generation : Low Allocation concealment: Low Selective reporting: Low	Blinding in application and determination: High/ Uncertain Incomplete outcome data: Uncertain Other bias: Uncertain
Bloom et al. (21)	USA	Primiparous N=272/272 Multiparous N=264/259	Ambulation versus usual care -confined to a labor bed	Duration of the first and second stages of labor, forceps birth, cesarean birth, induction rate	Random sequence generation: Uncertain Allocation concealment: Uncertain Selective reporting: Low	Blinding in application and determination: High/ Uncertain Incomplete outcome data: Uncertain Other bias: Uncertain
Gau et al. (15)	China	Primiparous- Multiparous N=48/39	Birth ball versus control group	Duration of the first and second stages of labor, vaginal and instrumental birth, pain	Random sequence generation: Low Allocation concealment: Low Selective reporting: Low	Blinding in application and determination: High/ Uncertain Incomplete outcome data: Uncertain Other bias: High
Chen et al. (18)	Japan	Primiparous N=22/23 Multiparous N=19/20	Upright position versus dorsal/lateral recumbent position	Duration of the first and second stages of labor, forceps birth	Random sequence generation: High Allocation concealment: High Selective reporting: High	Blinding in application and determination: High/ uncertain Incomplete outcome data: Uncertain Other bias: Uncertain
Diaz et al. (36)	Uruguay	Primiparous N=40/51 Multiparous N=105/173	Upright position versus lying in the bed	Duration of the first and second stages of labor, forceps birth	Random sequence generation: Uncertain Allocation concealment: Uncertain Selective reporting: Uncertain	Blinding in application and determination: High/ uncertain Incomplete outcome data: High Other bias: Uncertain
Miquelutti et al. (22)	Brazil	Primiparous N=54/53	Upright position versus routine care group	Duration of the first and second stages of labor, vaginal birth, pain, episiotomy, induction rate	Random sequence generation : Low Allocation concealment: Low Selective reporting: Low	Blinding in application and determination: High/ uncertain Incomplete outcome data: Uncertain Other bias: High
Williams et al. (19)	United Kingdom	Primiparous N=25/30 Multiparous N=23/25	Ambulation versus non-ambulation	Duration of the first and second stages of labor, vaginal, cesarean and forceps birth, induction rate	Random sequence generation: High Allocation concealment: High Selective reporting: Low	Blinding in application and determination: High/ uncertain Incomplete outcome data: Uncertain Other bias: Uncertain

**Table 1.** Characteristic characteristics of included studies to meta-analysis (Continue)

Study	Country	Participants	Intervention/ Control Group	Outcomes	Bias Risk	
McManus and Calder (32)	Scotland	Primiparous N=10/10 Multiparous N=10/10	Upright position versus recumbent	Vaginal, forceps and cesarean birth	Random sequence generation : Uncertain Allocation concealment: Low Selective reporting: Low	Blinding in application and determination: High/ uncertain Incomplete outcome data: Uncertain Other bias: Uncertain
Akin (14)	Turkey	Primiparous- Multiparous N=50/50	Upright position versus lateral position	Vaginal and cesarean birth, episiotomy	Random sequence generation : Low Allocation concealment: High Selective reporting: Low	Blinding in application and determination: High/ Uncertain Incomplete outcome data: Low Other bias: Uncertain
Haukkama (17)	Finland	Primiparous- Multiparous N=31/29	Upright position versus conventional bed care	The first stage of labor, types of birth, rate of oxytocin requirement	Random sequence generation: Uncertain Allocation concealment: Uncertain Selective reporting: Uncertain	Blinding in application and determination: High/ uncertain Incomplete outcome data: Low Other bias: Uncertain
Calvert et. al. (34)	United Kingdom	Primiparous- Multiparous N=45/55	Ambulation versus conventional bed care	Duration of the first and second stages of labor, vaginal, forceps and cesarean birth, pain, analgesia requirement	Random sequence generation : High Allocation concealment: High Selective reporting: Uncertain	Blinding in application and determination: High/ uncertain Incomplete outcome data: Low Other bias: Uncertain

**Data Analysis**

The study data were analyzed by Comprehensive Meta-Analysis software. Meta-analysis included;

**Assessment of Publication Bias**

Cochrane recommends that publication bias assessment is necessary for analyses that include more than 10 studies. Thus, we assessed the publication bias in accordance with Cochrane’s principles (30).

**Impact Size**

The impact size was measured with a confidence interval of 95% and RR because they have been reported to produce more sensitive results in binary (test–control groups) data (24).

**Choice of Study Model**

Compared with the fixed effects model, the random effects model has been considered favorable in a meta-analysis investigating the effects of an intervention in different study populations (24). Therefore, the random effects model was preferred in this study to measure the random errors and actual differences between interventions and study populations.

**Assessing Heterogeneity**

Reportedly, I<sup>2</sup> and Q statistics should be considered when assessing heterogeneity (24). Thus, heterogeneity was assessed with both Q and I<sup>2</sup> tests. The significance levels were set at 0.10 for the Q tests, and heterogeneity was established at ≥25% for the I<sup>2</sup> tests.

**Sensitivity Analysis**

Sensitivity analysis was performed to elucidate the degree of sensi-

tivity of the results of the combined effect size analyses. The analysis was conducted by adding and extracting studies with higher levels of bias risk and outlier data. The analysis was performed with a risk of bias tool designed by Cochrane. Studies with higher bias risks in two or more fields were considered to have higher bias risks. In contrast, outlier data were specified by considering the uncombined effect sizes of studies in the meta-analysis.

**Reporting Study Results**

The study results were evaluated and reported using the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement,” which identifies the principles of systematic reviews and meta-analysis reports (31).

**Ethical Considerations**

Considering that this study was designed as a literature review, the researchers did not seek any approval from The Board of Ethics.

**RESULTS**

The keywords were reviewed in 10 databases to find articles and unpublished graduate studies. The review yielded 22680 studies in total, and 13 studies that complied with the inclusion criteria and had full-text forms on the databases were included in the study. The studies were summarized according to the PRISMA Flow Diagram Guideline, as shown in Figure 1.

**Study Characteristics**

In total, 13 studies were included in the meta-analysis. The study characteristics are summarized in Table 1. Nine studies were conducted be-

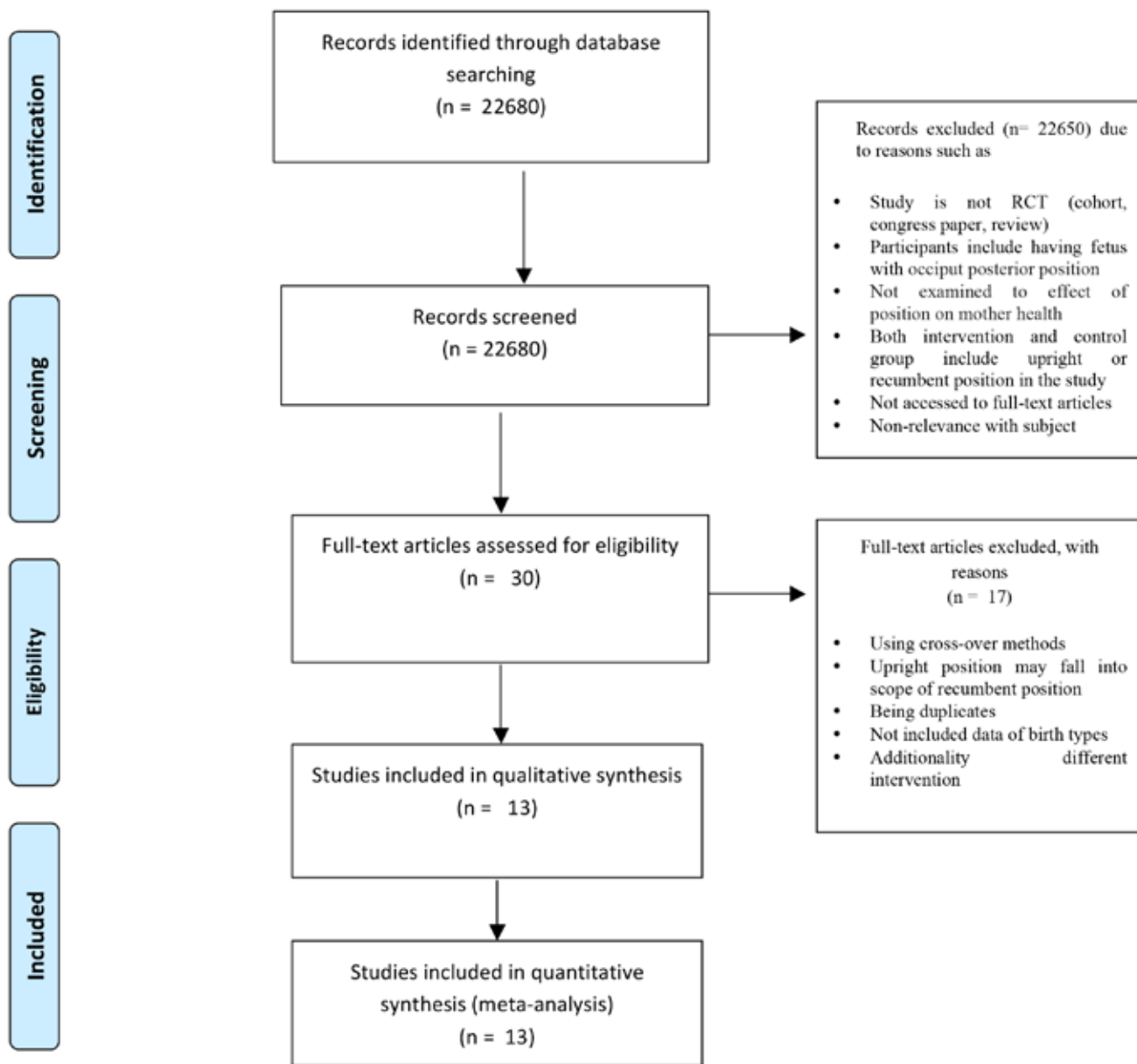


Figure 1. Study flow diagram of literature selection. RCT, randomized controlled trial (31)

tween 1978 and 1998, and four studies were conducted between 2000 and 2015. Some studies included both primiparous and multiparous mothers, but their data were individually presented. Accordingly, there were sample data of primiparous mothers in seven studies, multiparous mothers in five studies, and both primiparous and multiparous mothers in seven studies. Furthermore, nine studies included data on spontaneous birth, three studies included both instrumental and spontaneous births, and one study had no data on birth type. The upright birth types in those studies were ambulation (n=6), upright position (n=6), and birthing ball (n=2). Moreover, the horizontal positions in bed were supine lithotomy and traditional position.

**Bias Risk**

All studies included in the meta-analysis were evaluated with Cochrane’s Tool for Risk of Bias, and these studies identified bias risk of

varying degrees as unspecified, low, and high in terms of generating random sequence, confidentiality, double-blind studies where participants and the study staff were blinded, blind review in assessing results, incomplete study data, selectivity in reporting, and other sources of bias. The results are summarized in Table 1.

The random sequence generation procedures were analyzed, and random sequences were commonly generated by computers. The variables were stratified, and envelopes were shuffled, thus eventually resulting in low bias risks. Conversely, high bias risks were caused by the fact that random sequences were formed with hospital queue numbers, patient registration numbers, and several other variables. The random sequence generation procedures were not specified in some of these studies; therefore, they were labeled as unspecified (Table 1).

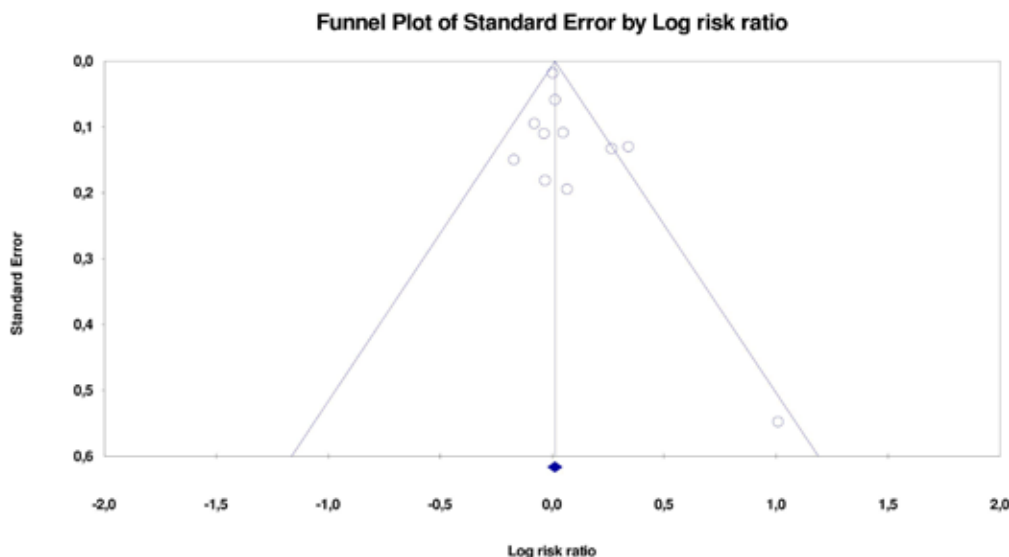


Figure 2. Funnel plot for the vaginal birth rate in the upright position

Confidentiality issues were also reviewed, and it was concluded that the confidentiality of the documents was not deliberately notified in a majority of studies. Some studies used nontransparent and sealed envelopes or numbered and sealed envelopes to reduce bias risk. In other studies, bias risk was found to be higher because the random distribution table and patient registration numbers were easily accessible (Table 1).

Moreover, double-blinding procedures were evaluated. In some cases, participants and health professionals were not blinded because of the nature of studies. However, it should be noted that not blinding participant mothers and the staff may increase bias risk. Furthermore, whether the study results were assessed with blind peer review was not recorded. A study conducted by Akin (14) was peculiarly distinguished among all other studies because the expert who evaluated the NST results was blinded. Unfortunately, given that the study data were not evaluated with a blind review, bias risk was still categorized as unspecified (Table 1).

Incomplete study data were also analyzed, and it was reported that some studies presented the number of spontaneous labor; however, the number of instrumental labor remained uncertain. Furthermore, some studies had missing data after randomization, and bias risk was found to be lower because the intention-to-treat analysis was performed with missing data, whereas some studies with missing data produced a high bias risk because ITT analysis was not conducted (Table 1).

Bias risk was already a problem during reporting procedures, and it was noted that the anticipated primary and secondary results were included in the reports, whereas unanticipated results were excluded. This situation might have resulted in the lower bias risk. In contrast, studies in which anticipated results were not reported had high bias risks (Table 1).

The studies were also reviewed with a view to other sources of bias, and it was consequently suggested that study methods, interven-

tions, or assessment criteria were not particularly specified in detail in some of these studies (Table 1).

### Meta-Analysis Results

#### Effect of the Upright Position on Spontaneous Birth Rate

Eleven studies were reviewed to analyze effects of the upright position on spontaneous birth rates. Bias risk in these studies was analyzed, and the majority of studies were found to be closer to the combined size effect values at the upper part of the diagram, indicating that there was no risk of publication bias (Figure 2).

The minimum effect size of the upright position on spontaneous birth was reported to be  $RR=0.845$  (95%  $CI=0.629-1.135$ ), and the maximum effect size value was  $RR=2.750$  (95%  $CI=0.938-8.059$ ) (Figure 3). Most of the studies include The null hypothesis (Figure 3).

The effect sizes were heterogeneously distributed because the Q value ( $Q = 16.277$ ) was higher than the critical value of the chi-square distribution ( $\chi^2 0.95=15.987$ ) with 10 degrees of freedom (DOFs), and the  $I^2$  value was 38.563% ( $\geq 25\%$ ). The effect size of spontaneous birth rate, according to the random effects models, was reported as 1.035 (95%  $CI=0.961-1.115$ ).

When studies with high bias risks in more than two fields were excluded, the overall effect size was 1.042 (95%  $CI=0.955-1.136$ ) according to the random effects model and was 1.027 (95%  $CI=0.961-1.098$ ) when outlier data were excluded from the analysis. The sensitivity analysis also yielded no changes in the overall effect size. Moreover, outlier data were exempted from the analysis, and the effect size confidence interval was narrower and less heterogeneous.

#### Effects of the Upright Position on Cesarean Birth Rate

Nine studies were reviewed to analyze the effects of the upright position on cesarean birth rate among mothers who did not receive routine epidural anesthesia in the first stage of labor. Consequently, the minimum effect size was 0.100 (95%  $CI=0.013-0.752$ ), whereas the

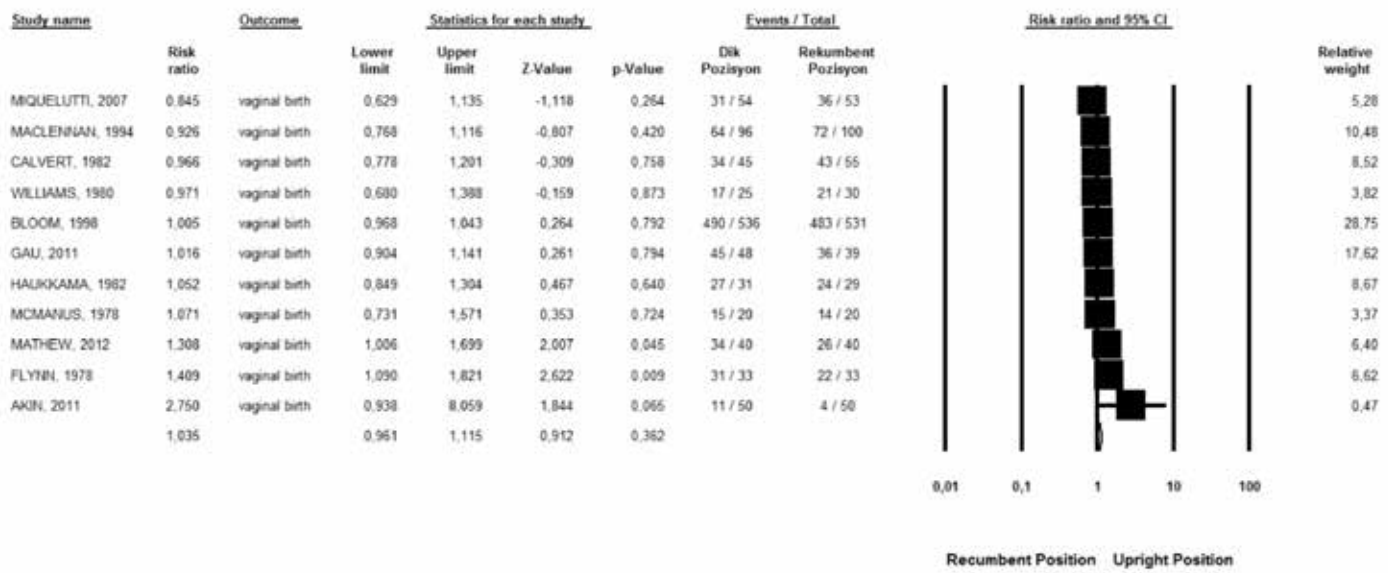


Figure 3. Forest plot for the vaginal birth rate in the upright position

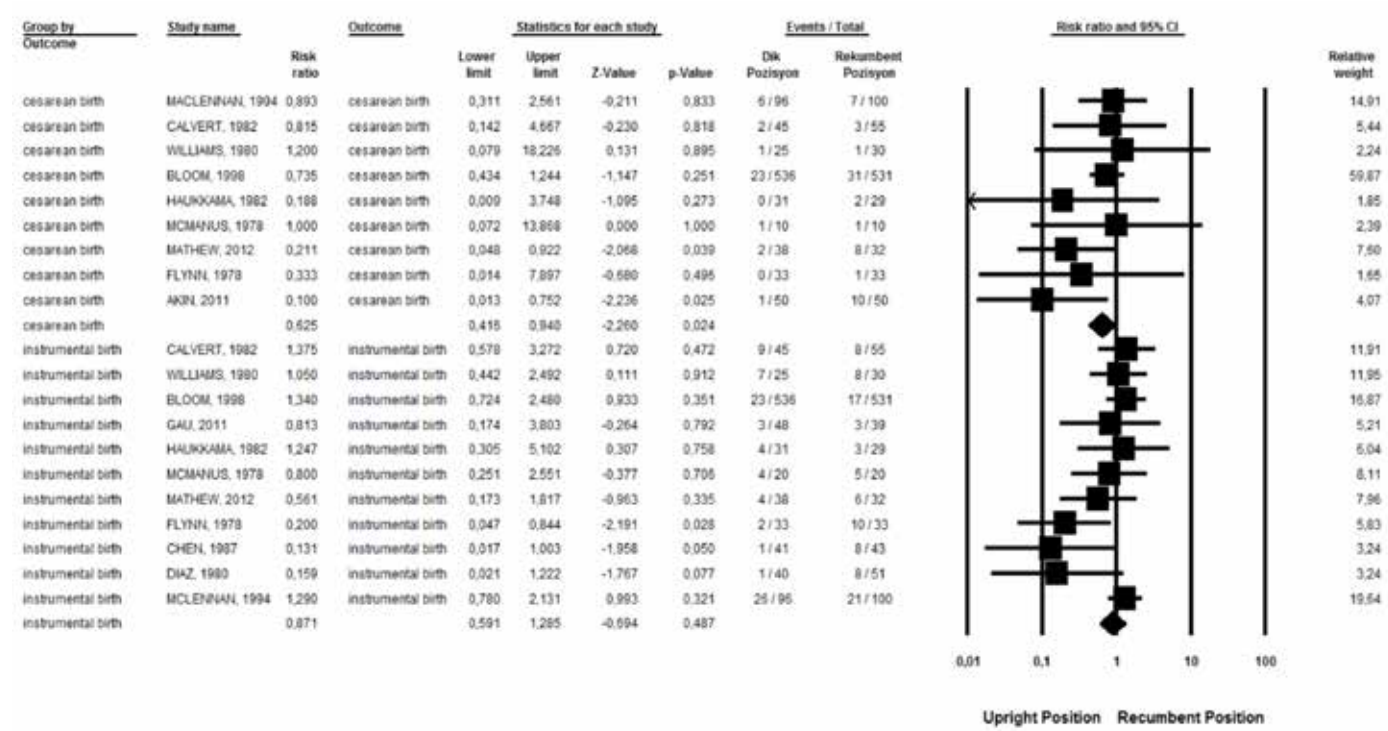


Figure 4. Forest plot for instrumental and cesarean birth rate in the upright position

maximum effect size was 1.200 (95% CI=0.079–18.226). The individual effect sizes of each study were also analyzed, and seven studies were noted to have higher effect sizes in the upright position, one study in the recumbent position (19), and one study comprised of the null hypothesis (32) (Figure 4).

Further, the effect sizes were heterogeneously distributed because the Q value (Q=7.265) was lower than the critical value of the chi-square distribution ( $\chi^2 0.95=13.362$ ) with 8 DOFs, and the I<sup>2</sup> value was

0%. According to the random effects model, the effect size of the cesarean rate was 0.625 (95% CI=0.416–0.940). The overall effect size according to the random effects model was 0.602 (95% CI=0.319–1.134) when studies with higher bias risks were excluded. Adding or extracting studies with higher bias risks in several fields was reported to cause statistically insignificant changes in the overall effect size. When studies with higher bias risks were excluded, it was suggested that the effect size reliability interval and heterogeneity (I<sup>2</sup> increased from 0% to 29.48) were higher.

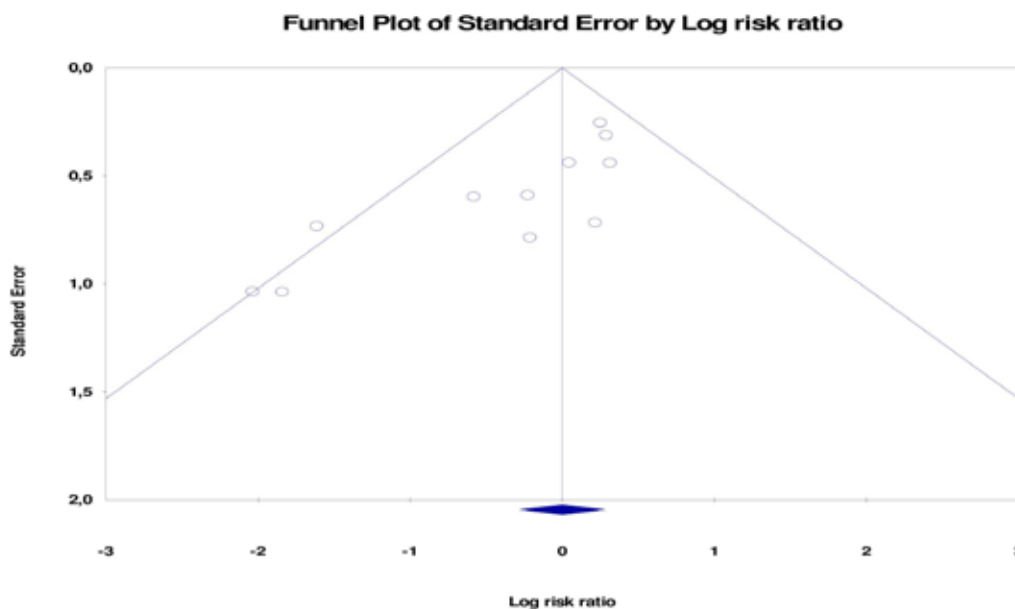


Figure 5. Funnel plot for the instrumental birth rate in the upright position

#### Effects of the Upright Position on Instrumental Birth Rate

Eleven studies were analyzed to investigate the effects of the upright position on instrumental birth rate among mothers who did not receive routine epidural anesthesia in the first stage of labor. As illustrated in Figure 5, the studies in the review were closer to the combined size effect values at the upper part of the diagram, but it is noteworthy that three studies were at the boundary of the funnel plot. Nevertheless, it should be kept in mind that publication bias is caused by the selection of publications as well as by the actual heterogeneity of the studies (33).

The minimum effect size of the upright position on instrumental labor was  $RR=0.131$  (95%  $CI=0.017-1.003$ ), and the maximum was  $RR=1.375$  (95%  $CI=0.578-3.272$ ). The individual effect sizes of studies in the review were also discussed. Six studies had higher effect sizes in the upright position, whereas five studies had higher effect sizes in the recumbent position (19) (17, 19–21, 34) (Figure 4).

The effect sizes were heterogeneously distributed because the  $Q$  value ( $Q=15.377$ ) was lower than the critical value of the chi-square distribution ( $\chi^2_{0.95}=15.987$ ) with 10 DOFs. The  $I^2$  value was 34.967% ( $\geq 25\%$ ). The overall effect size of the instrumental birth rate was 0.871 (95%  $CI=0.591-1.285$ ) according to the random effects model.

Moreover, the overall effect size was 0.880 (95%  $CI=0.531-1.459$ ) when studies with higher bias risks were excluded, and it was 1.158 (95%  $CI=0.864-1.552$ ) when outlier values were exempted from the review. Further, adding or extracting studies with higher bias risks in several fields did not considerably change the overall effect but particularly produced a wider confidence size with less heterogeneity.

#### DISCUSSION

This meta-analysis primarily aimed to investigate the effects of the upright position on birth types in mothers who did not receive rou-

tine epidural anesthesia in the first stage of labor. The reviewed studies were published between 1978 and 2015. Although the subject of the study has been popular among researchers for many years, these studies have produced various and sometimes contradictory results. This particular review established high levels of evidence and focused on the causes and the diversity of study results.

Consequently, the effect of the upright position on spontaneous birth was found to be statistically insignificant in mothers who did not receive routine epidural anesthesia in the first stage of labor, which was also confirmed by a relevant meta-analysis (23). The results of similar studies have demonstrated lower spontaneous birth rates in the upright position (19, 20, 22, 34), but some other studies have reported the upright position to be associated with higher spontaneous birth rates (10, 14, 16); this finding could be attributed to the duration of upright position in labor. Given that the latter had higher bias risks, the study results should be analyzed with utmost care. Balaskas (4) has suggested in her Active Birth Manifesto that there is no stable position while giving birth but has also argued that a variety of positions, such as standing, walking, and sitting, can be adopted during spontaneous birth (4).

The upright position greatly reduced the cesarean birth rate in mothers who did not receive routine epidural anesthesia in the first stage of labor. Similarly, the effect size of the upright position on cesarean birth rate was  $RR=0.71$  (95%  $CI=0.54-0.94$ ) (23). In contrast, several reviewed studies have demonstrated lower cesarean birth rates and insignificant effect sizes (10, 14, 16, 17, 20, 21, 34). Further, all studies had either unspecified or higher bias risks. The results of our sensitivity analysis indicated that the overall effect size was statistically insignificant, but the study results had a wider confidence interval and higher heterogeneity ( $I^2$  increased from 0% to 29.48%). Nevertheless, a meta-analysis is usually expected to have a narrower confidence interval and less heterogeneity (35). Therefore, it was deduced that further studies would be required to elucidate the effects of birth position on the cesarean birth rate.



Additionally, the upright position minimized the need for instrumental birth rate with insignificant effect sizes among mothers who did not receive routine epidural anesthesia in the first stage of labor. Lawrence et al. (23) have found in a meta-analysis that the effects of upright size on instrumental labor were insignificant, which complied with the results of our study (23). Furthermore, the effect size did not considerably change when outlier data were excluded from the study; this approach radically decreased heterogeneity. Studies with outlier data were suggested to have higher or unspecified levels of bias risk (16, 18, 36). Thus, it might be considered that heterogeneity may stem from high or unspecified levels of bias risk. RCM, in an advisory guideline for birth positions, has recommended that mobility during labor should be encouraged among mothers unless it is already compulsory and has been proved to have medical risks (6).

The limitations of this particular review are as follows: the researchers did not have access to the full text of studies that complied with the inclusion criteria, the review included studies written in Turkish or English only, moderator analysis could not be conducted because of the insufficient number of studies, and the duration of intervention largely varied in primary studies.

## CONCLUSION

In conclusion, the effect of the upright position on spontaneous or instrumental birth rates in the first stage of labor was insignificant, but this position considerably decreased cesarean birth rates. The upright position helped mothers to cope with labor pain and relieve anxiety; this finding could be promising in reducing rapidly increasing elective cesarean rates in Turkey. In clinical practice, health professionals are recommended to prefer the upright positions in mothers who do not receive routine epidural anesthesia in the first stage of labor because this position is clinically safe and emotionally supportive. However, the ideal birth position should be decided on the basis of individual risks. Further randomized controlled studies are warranted to investigate the maternal results of the upright position in mothers who do not receive epidural anesthesia in the first stage of labor, with a particular emphasis on the sensitivity of the effect size in reducing cesarean birth rates.

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