

# **Title: Complications Associated With Waterbirth: A Systematic Review and Meta-Analysis**

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## **Background/Synopsis**

Waterbirth, defined as completion of the second stage of labor underwater, is a practice that is not currently recommended by American College of Gynecology given insufficient evidence supporting its safety. Current published systemic reviews and meta-analyses have reviewed information up to 2015, however there are no updated systematic reviews or meta-analyses that review recent literature published after 2015.

## **Objective**

The objective of this study was to perform a systematic review with meta-analysis to investigate if there are any significant increase in complications associated with waterbirth. The primary outcome was defined as clinically significant maternal infection, including chorioamnionitis and endometritis, both defined as per each individual study. Secondary outcomes will include cord avulsion, abnormal APGAR scores (defined as scores of less than 7 at 5 minutes), neonatal aspiration requiring resuscitation, neonatal sepsis within seven days of birth, neonatal mortality within 30 days of birth, NICU admission, umbilical cord pH, postpartum hemorrhage, and perineal lacerations.

## **Methods**

We included studies that reported maternal and neonatal outcomes of women who underwent waterbirth using the outcomes provided above. A total of 1900 articles were reviewed by title. Ultimately, 51 articles were included- 5 randomized trials and 46 non-randomized studies.

Raw data were extracted using 2x2 tables for each outcome measured. When data were reported as median and interquartile range, the mean and SD were estimated. Meta-analyses were performed for each maternal and neonatal outcome with Stata 15. Relative risk and 95% confidence intervals were calculated for each outcome for women that underwent waterbirth compared to those that underwent land birth. Summary effects estimates were calculated. Heterogeneity was assessed by implementation of the I<sup>2</sup> statistic, Brewlow-Day and L'Abbe plots. Publication bias was planned to be assessed using the Egger test and by inspection of funnel plots, which plotted log odds ratio against study sample size. Studies were not excluded if the scoring was low.

Sensitivity analyses were performed by omitting each study sequentially and analyzing the overall effect of that study on the pooled results. Meta-regression analysis was planned to identify potential causes of heterogeneity among any statistically significant outcomes by an examination of the important covariables of parity and spontaneous versus natural labor.

## **Conclusion**

Cord avulsion was the only outcome found to be statistically more significant with waterbirth. This finding is clinically relevant because of the risk of fetal exsanguination and neonatal anemia. APGAR scores of <7 were statistically more significant in landbirth, which was

a finding in both randomized and observational studies. This finding may be confounded by patient risk factors that made them poor candidates for waterbirth. All other outcomes showed no difference between landbirth and waterbirth groups.