Abstract

**Background:** Labor is a physiological process during which the fetus, the membranes, the umbilical cord, and the placenta are expelled from the uterus and water delivery has become popular, although its prevalence is unknown, it is supported by healthy women with full-term pregnancies, without complications; although there is insufficient evidence to support or discourage it.

**Objective:** To identify obstetric and neonatal outcomes and complications in women who delivered in water and to compare them with traditional deliveries.

**Material and methods:** It is a retrospective, observational and cross-sectional study, where 2486 women were included from a database of 4223 women assisted from 2004 to 2020 in private hospitals; Of the 2486 patients included, 1025 had a water delivery and 1461 had a conventional delivery, discarding 1737 women who underwent
Background

Labor is a physiological process during which the fetus, membranes, umbilical cord, and placenta are expelled from the uterus. The initial evaluation of labor should include a review of the patient's prenatal care, including confirmation of the estimated date of delivery.

Water delivery during labor or delivery has become popular in recent decades, although its prevalence is unknown [1], due to the lack of reports, even lack of records in birth certificates and varies according to cultural factors [2,3], that vary from 1.5% in hospitals to 58% in independent clinics [2,4], although, it relies on healthy women with full-term pregnancies, without complications having their labor and delivery in water [5,6], there is insufficient high-quality evidence to support or discourage it [7].

Labor or water delivery often does not have a uniform definition; this is generally known as "water birth," but the effects and results may be different for immersion during the first stage of labor and the second stage, including delivery. By distinguishing data and related outcomes separately during the first from second stages of labor and delivery. Not all studies identify them, considering the results for all women together, in the first and second stages of labor and delivery [2,8]. Safety or risk in association with labor in water translates into results equivalents in a different stage of labor; specifically, the results during the first stage of labor may not be the same as the results associated with underwater birth [1,2,8-12].

Conditions vary between retrospective, observational, prospective, and randomized clinical trials. Retrospective studies, often reporting single-center data, cannot demonstrate causal relationships between observed outcomes and exposure to water labor. Retrospective and prospective observational studies categorize outcomes, including stage 2 through water calving, according to actual exposures (rather than predicted) at immersion [4,9,11,13-17].

Most studies consider only healthy women with singleton pregnancies with cephalic presenting fetuses as candidates for a water birth, which limits the generalizability of results [2,8,10,18].

During the first stage of water labor, it was associated with a decrease in the use of epidural, spinal, or paracervical analgesia in women for water delivery compared to controls; there was a reduction in the duration of the first stage of labor, there were no differences in the incidence or severity of perineal trauma, including third and fourth-degree lacerations, and episiotomy or caesarean section.

Results: A total of 2486 women were included in this study, the birth in 1025 was water delivery (24%) and 1461 was conventional delivery (35%), 1737 caesarean section (41%) were excluded from the study, no difference was observed maternal age; unlike weight, height, body mass index; they were higher in women with water birth compared to conventional. No difference was demonstrated between nulliparous (45.99%) and multiparous (53.86%) when comparing both births in water and conventional; only increase in previous cesarean sections (9.36 vs 6.5%, p = 0.008) and decrease in previous abortions (16.19 vs 20.94%, p = 0.002) in water delivery with the conventional one; complications were not different: administration of oxytocin (3.2 vs 3.1) or postpartum hemorrhage (0.29 vs 0.13) in both deliveries; no differences in first degree perineal tears (21.4 vs 18.5%); Only for the second and third-degree was it greater in conventional delivery than in water delivery (6.6 vs 11.4%, p = 0.00), (0 vs 2.8%) respectively, only 1.9% of deliveries in water that required epidural block ended in delivery conventional.

Conclusion: Water birth reduces stress, pain sensation, second and third-degree perineal lacerations and contributes to better newborn outcomes; the selection and inclusion of patients with low-risk pregnancies allow better perinatal results than conventional delivery; but, further studies are required to use it routinely.
The woman who requests water delivery should be informed about the benefits and risks of the mother and the perinatal, it is not studied enough to support or discourage it; Rare but serious neonatal complications associated with this choice should be reported.

Prospective studies on maternal and perinatal benefits and risks associated with waterborne labor and delivery are not precluded.

Facilities during labor and water delivery must establish rigorous protocols for the selection of candidates; maintenance and cleaning of bathtubs and tubs or swimming pools; infection control procedures and personal protective equipment for health care personnel; monitoring of women and fetuses at appropriate intervals while submerged; and removing women from the water if urgent maternal or fetal concerns or complications arise [21].

Material and method

Retrospective, observational and cross-sectional study, which included 2486 women who were part of a database of 4223 women. They carried out their pregnancy monitoring at the PRONATAL clinic (Interior of Hospital Bité Médica, Mexico City) and had their delivery at Hospital Médica Sur Lomas, between 2004 and 2012 and Hospital Bité Médica, between 2013 and 2020. Of the 2486 patients included, 1025 had a water delivery and 1461 had a conventional delivery, discarding 1777 women who had cesarean delivery from the study. Inclusion criteria: Patients of reproductive age, low-risk pregnant patients, patients with a single pregnancy, water, and conventional deliveries, spontaneous pregnancies and by assisted reproductive techniques (ART), with a history of 2 or fewer cesarean sections, with a history of 1 or more abortions. Exclusion criteria: Twin pregnancies, cesarean section due to patient decision, and cesarean section due to fetal or maternal compromise (pre-eclampsia, intrauterine growth restriction, thrombosis, etc.).

The information obtained from the patients was collected from the notebooks provided by the hospital (Labor, delivery and resuscitation) of the Bité Médica hospital and from the digital records of the PRONATAL Clinic, obtaining anthropometric data (Mother: age, weight and height), delivery results (weeks of gestation, perineal tear, nulliparous, multiparous, cesarean sections and abortions) and neonatal data (Newborn: Weight, height, Apgar at minute 1 and 5).

The data obtained to carry out this study were handled with discretion and the anonymity of the patients was maintained. The data obtained will be analyzed in 2 ways: non-parametric data are reported in percentages and were analyzed using “Chi-square” (perineal lacerations, epidural block, oxytocin, nulliparous, multiparous, cesarean sections, and previous abortions) and 2) parametric data (Mother: age, weight, height, gestation weeks and Body Mass Index (BMI), and baby perinatal data: weight, height and APGAR) are reported as mean plus standard deviation (± SD) and are analyzed using “T student”, using the statistical package SPSS version 25.

Results

A total of 2486 women were included in this study, among whom 1025 were waterborne (24.4%) and 1461 were conventional delivery (35%), additionally, 1737 women who had a caesarean delivery (41%) were excluded from the study (Figure 1).

Within the maternal data, no difference in age is observed when comparing water delivery vs conventional delivery (33.6 ± 33.3 years), unlike weight (67.07 ± 9.8 vs 61.2 ± 10.5 kg, p = 0.05), height (1.65 ± 0.06 vs 1.62 ± 0.05, p = 0.02) and BMI (24.4 ± 3.7 vs 23.07 ± 3.5, p = 0.001), which showed an increase in the water calving group compared to the conventional calving group. Regarding the history of previous pregnancies, no difference was shown between nulliparous patients (44.8 vs 45.99%) and multiparous (55.02 vs 53.86%) when comparing the water delivery group against the conventional delivery group. They only showed an increase in previous cesarean sections (9.36 vs 6.5%, p = 0.008) in water delivery when compared with conventional delivery and a decrease in previous abortions (16.19 vs 20.94%, p = 0.002) in the water delivery group when compared with childbirth. Conventional, Table 1.

In the complications that occurred during delivery, there was no significant difference in the application of oxytocin (3.2 vs 3.1) and in the presence of hemorrhage (0.29 vs 0.13) between the water delivery group and conventional delivery. Regarding perineal lacerations: first degree, they have no significant difference (21.4 vs 18.5%) when comparing water delivery vs conventional delivery, second degree, presents a statistically significant increase in conventional delivery when compared with water delivery (6.6 vs 11.4%, p = 0.00) and third-degree presents an increase in conventional delivery compared to water delivery (0 vs 2.8%), additionally, 1.9% of water deliveries underwent epidural blockage and ended in conventional delivery Table 1.

Regarding the perinatal data, the weight of the babies was statistically higher in the water delivery group compared to the conventional delivery group (3067.4 ± 359.9 vs 3059.7 ±
The evidence of immersion during the first stage of labor is difficult to estimate blood loss in women and their newborns.

Many women choose to work and give birth in water (water immersion) and this practice is becoming more popular in many countries, particularly in midwifery-led units. Therefore, it is important to understand more about the benefits of water immersion during labor and delivery for women and their newborns, along with the risks.

It is important to examine whether immersion in water during the first and/or second stage of labor has the potential to maximize women’s ability to manage labor pain and have a normal delivery without increasing the risk of an adverse (harmful) event. Adverse events may pose an increased risk of infection for women and/or their newborns; a greater chance of a severe tear of the perineum (the area between the anus and the vagina), and can make it difficult to estimate blood loss in the event of bleeding. When evaluating benefits, we consider wellness to encompass both physical and psychological health.

Immersion in water during early labor will likely result in fewer women having an epidural, but it likely makes little or no difference to the number of women who have a normal vaginal delivery, instrumental delivery, cesarean section, or a severe perineal tear. We are uncertain about the effect on the amount of blood loss after birth because the quality of the evidence was very low. Water labor can also make little or no difference for babies to enter the neonatal intensive care unit or develop infections. No stillbirths or infant deaths were reported.

In healthy women at low risk of complications, there is moderate to low-quality evidence that immersion in water during early labor probably has little effect on mode of delivery or perineal trauma but may reduce the use of regional analgesia. The evidence of immersion during the second stage of labor is limited and shows no clear differences in maternal or neonatal outcomes in intensive care. There is no evidence of increased adverse effects to the fetus/newborn or woman from labor or delivery in water. The available evidence is limited by clinical variability and heterogeneity between trials, and no specialist-designed studies have been performed.

While the changes that occur during pregnancy are slow and gradual, childbirth generates bodily changes that are intense and abrupt, which are accompanied by pain, which differs from person to person and can be influenced by physical, psychological, and cultural conditions [24–29]. On the other hand, anxiety and fear can increase plasma concentrations of catecholamines, which is associated with an increased risk of developing severe perineal tears and the perception of pain is magnified. In fact, prenatal fears have been seen to complicate and prolong labor, increase the intensity of pain, leading to a negative experience on the part of the mother [18,21,25].
Considering the physiological changes associated with childbirth, different methods with minimal intervention, medication and low incidence of complications for both the mother and the newborn have been investigated in a large number of studies. It is the case of water delivery that has a prevalence in this study of 24%, Figure 1, where studies have reported a decrease in antispasmodic drugs, analgesics and opioids, compared to conventional delivery [18,21]. Because relaxation of the mother’s body is generated, resulting in decreased pain during labor [30-33]. Similarly, in this study, there was a greater number of women who gave birth by water delivery compared to conventional delivery, who were able to complete the expulsion of the baby and the placenta, without the application of epidural block (98.1 vs 46.9%, p = 0.00), Table 1. Another benefit observed in water birth compared to conventional birth is the decrease in perineal lacerations, as shown by Costa J. 2019, who report that water birth has a protective effect against third-degree perineal lacerations (0 vs 19.4%) [18].

Similarly, this study showed a statistically significant decrease in second-degree perineal lacerations (6.6 vs 11.4%, p < 0.00) and third-degree (0 vs 2.8%) in women who had water birth when compared to those who had Conventional delivery, Table 1. Within our results, we observed no difference in the presence of bleeding (0.9 vs 0.1%), between the water delivery group and the conventional delivery group, Table 1.

Found no difference in the prevalence of bleeding among women with water birth compared with conventional birth [29]. In water childbirth studies report decreased release of stress hormones such as catecholamines compared to conventional delivery, allowing the more efficient release of oxytocin and labor progression [6,8,20,36], due to reducing anxiety, pain, physiological stress and psychological [32]. In addition to this, in this work, no difference was found in the application of oxytocin in water delivery when compared to conventional delivery (3.2 vs 3.1%) Table 1.

The women who decided to have a water birth in this study had greater weight (67.07 ± 9.8 vs 61.2 ± 10.5, p < 0.05) and height (1.65 ± 0.06 vs 1.62 ± 0.05, p < 0.02) compared to those who decided to give birth conventional. None of the groups presented high levels of BMI (24.4 ± 3.7 vs 23.07 ± 3.5, p = 0.001) Table 1, coinciding with studies where the preference for water delivery was higher in women with BMI less than 30 due to complications that can occur in obese women [35-41].

Regarding neonatal data, the weight of babies at birth was higher in water delivery compared to conventional delivery (3067.4 ± 359.9 vs 3059.7 ± 435.2, p = 0.02), in turn, the APGAR in minute 1 did not present a significant difference between water and conventional calving (8.9 ± 0.3 vs 9 ± 3.4), unlike APGAR in minute 5 (9.62 ± 0.4 vs 9.5 ± 0.5, p = 0.00), which was greater in water calving compared to calving conventional Table 1; different from that reported [42-44], who report similar APGAR values at minute 1 and 5, between water and conventional delivery.

This work provides information to support women’s right to access medically supported and non-pharmacological pain relief options during labor only if needed. Coinciding with studies that suggest that water delivery is a factor that drives the improvement of the delivery experience [21,27,45,46]. Regarding the decision to deliver in water, decision-making is often limited by lack of access to hydrotherapy tubs, access to intermittent auscultation as a primary form of fetal surveillance, and lack of screening tests. Standardized to establish births with low medical risk, which were the main inclusion criteria in this work for water births.

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