



## Case Report

# A case series on maternal and neonatal outcomes of hydrotherapy during labor and childbirth

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## ARTICLE INFO

### Article history:

Received 18-02-2020

Accepted 23-03-2020

Available online 15-06-2020

### Keywords:

Water birth

Delivery

Childbirth

Labor

Hydrotherapy

Birth options

## ABSTRACT

**Background:** Hydrotherapy, is also called as aquatic or water therapy, and its benefits include improved muscle strength and endurance, increased joint range of motion and enhanced cardio respiratory functioning and reduced cardio metabolic risk profile. Utilization of hydrotherapy during labor and child birth is increasing globally among the educated public. Despite its exclusive benefits, data on its safety and outcomes are still lacking especially in India. Hence it is the need of the hour for the clinicians to discuss the potential benefits and safety of water birth and utilize it particularly for women with uncomplicated pregnancy who prefer physiological childbirth and wish to avoid the use of pharmacological pain relief methods.

**Objectives:** To assess and validate about the maternal and neonatal outcomes of hydrobirthing from a series of parturients who volunteered for the utilization of hydrotherapy during labor and childbirth.

**Materials and Methods:** This case series consist of 26 out of 33 pregnant women who opted for hydrobirthing between 1 December 2015 and 31 April 2019 at a tertiary care hospital with NABH accreditation. Booked cases with uncomplicated pregnancy and who were on regular antenatal check up, with gestational age >37 <42 weeks and were included in the study after obtaining the informed consent. The dataset was limited to vaginal delivery following spontaneous labor and included pre-specified outcomes such as labor pain, perineal tear, episiotomy, post partum hemorrhage (PPH), temperature after delivery and apgar scores of the new born to evaluate the maternal and fetal outcomes following hydrotherapy and the results were discussed.

**Conclusions:** The present case series on hydro birthing has demonstrated that it is one among the safe natural mode of labor without any serious maternal and neonatal complications. Further study on a large scale with evaluation of long-term outcomes would help to generalise the observed outcomes of the present study.

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## 1. Introduction

Hydrotherapy (aquatic/water therapy) is one of the most popular forms of complementary therapies towards the treatment and rehabilitation purposes in musculoskeletal and neurological disorders.<sup>1</sup> The therapeutic benefits of hydrotherapy may relate to the following fundamental principles of hydrodynamics such as density, drag, buoyancy, hydrostatic pressure and thermodynamics.<sup>2</sup> The use of hydrotherapy during labor and birth is known

as hydro birthing or water birth. It is generally defined as a neonate being purposely born under warm water pool. During water birth, the neonate is swiftly brought to the surface, due to diving reflex, which mechanically blocks the airway of submerged infants (although not older children or adults), thereby the newborn is prevented from aspirating the water.<sup>3</sup> The maternal benefits of laboring in water, are pain relief, reduced stress on tissues secondary to buoyancy, accelerate cervical dilation, resolve labor dystocia, increased self-esteem and contribute to postpartum maternal satisfaction with childbirth.<sup>4-6</sup> The impending benefits of hydrobirthing for a neonate is

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being born into a warm, liquid environment similar to the amniotic fluid resulting in comfortable condition without any trauma.<sup>7</sup>

Although the safety and efficacy of immersion hydrotherapy are well established for the first stage of labor,<sup>8</sup> research evidence on water birth is limited and no large rigorous studies exist. Hence there continues to be resistance of hydrobirthing in mainstream delivery wards especially in developing countries like India. Despite of these circumstances, water birth continues to be a birth option at a tertiary care hospital of Tamil Nadu, India that has an exclusive birthing centre with NABH accreditation (PESHCO-2018-0332). The present case series is the first publication on hydro birthing and was conducted amongst 26 low risk women who voluntarily opted for birthing in warm water to determine the rates of perineal trauma, postpartum haemorrhage, 1 and 5 minute Apgar scores and other variables of interest contributing to maternal and fetal outcomes towards creating a generalised idea of hydrobirthing and its outcomes.

## 2. Materials and Methods

The present data was collected from a case series of 26 pregnant women out of 33 parturients who had given consent for hydrobirthing at a tertiary care hospital between 1 December 2015 and 31 April 2019. It was mandatory for the spouse to accompany the pregnant women for all antenatal classes and training as it gives moral support to relieve fear and anxiety of delivery and also to help the mother in postural changes and in providing other comfort measures.<sup>9</sup>

### 2.1. Selection of pregnant women for hydrobirthing

The inclusion criteria consisted of  $> 37 < 42$  weeks of gestational age, couples who were willing to give consent for water birth, normal fetal heart rate (FHR), single fetus with cephalic presentation. The exclusion criteria included,  $< 37 > 42$  weeks of gestational age, twin pregnancy, anemia, pregnancy induced hypertension, gestational diabetes mellitus, Hydrophobia, previous history of diabetes mellitus, cardiovascular disease, other pregnancy complications or any viral infections like HIV, HbsAg, skin and vaginal infection. The patient, spouse and family members were counselled and consent was obtained. The eligibility criteria to participate in this study included booked pregnant women for labour and delivery at Bloom Birthing Centre with low risk, regular antenatal check up (AICOG) during first, second and third trimesters for investigations, immunizations/Haematinic supplementation and anomaly detection. Those couples who had regular attendance to antenatal exercise and child birth classes, signed for physiotherapy at 20<sup>th</sup> week and who had previous aquatic training.

### 2.2. Protocol of hydro birthing

An air filled water tub placed in a hygienic room was filled with purified warm 36 – 37° (with the mean of 37°) drinking water. When the pregnant woman gets labor pain in bed (first stage of labor), the uterine contractions were monitored, PV examination was done as and when needed, Fetal heart sound (FHS) and Pulse rate was monitored once in every hour. Blood pressure (BP), Cardiotocography (CTG) were taken and kept in observation up to 3cm dilation as the first step and then the parturient was allowed to enter into the warm water tub during the active stage of labor so that immersion was to above the breasts when sitting and all women received one to one midwifery care. The maximum stay in the pool before reassessment by vaginal examination was four hours. If labor progress was satisfactory (cervical dilation  $\geq 1$  cm/hour), subsequent care could continue in the pool if the woman wished, otherwise augmentation was advised.<sup>10,11</sup>

Every half an hour FHS was monitored with waterproof fetal Doppler and the woman was asked to sit in a place above the water level for CTG monitoring for the fetal well being. The BP, pulse of the woman was noted, and she was allowed to change her position according to her convenience. During this stage PV examination was done in the water itself to assess the cervical dilation, descend of the head, and progress of labor. When the parturient feels like pushing the baby, she is encouraged to do so. Caution was taken to deliver the head slowly followed by the rest of the body to avoid cord tear. When the head is seen at the vulval outlet, the head is delivered, quickly brought out of the water level, delayed cord clamping was done, baby separated from mother and was given back to the mother for skin to skin contact. Simultaneously the baby was monitored by the paediatrician. Then the mother is brought from the tub allowed to lie on the cot to confirm the separation of placenta then deliver the placenta. The mother was carefully monitored for uterine contractions, perineal tear and postpartum hemorrhage. During this procedure the mother would be supported by her husband or any other birth partner as she wishes along with a team of gynaecologist, paediatrician, nurses and midwives. All the above procedures and protocol of hydro birthing and parameters for assessment of safety and benefits were based on the guidelines for water birth proposed by the American College of Obstetricians and Gynecologists (ACOG), Royal College of Midwives (RCOM).<sup>12,13</sup>

### 2.3. Ethical issues

The informed consent included the client information and consent form with the benefits of hydrobirthing such as less pain, improved relaxation, decreased need for episiotomy, lower blood pressure, decreased anxiety and often a faster labor although not all the benefits can be supported by

research. The consent form also included the proposed risk of hydrobirthing such as chances of infection, bleeding, chances of mother may slip or fall while getting out of tub, hypo/hyperthermia of mother or baby, difficulty in the management of shoulder dystocia. All the potential benefits and the rare complications of hydrotherapy during labor were clearly explained in the antenatal child birth classes during the second trimester. The parturients were also informed that they may be asked to leave the tub in case of elevated temperature, changes in the baby's heart rate, bleeding, need for an episiotomy, difficult labor or any other complication that may necessitate to leave the tub. They were also assured that they may be allowed to leave the tub whenever she decides to do so.<sup>12,13</sup>

### 3. Results and Discussion

**Table 1:** Effects of hydro birthing on fetal parameters

S. No	Birth weight	Apgar score (1 min)	Apgar score (5 min)	NICU Admission (Days)
1.	2.8	7	8	-
2.	3.25	7	8	-
3.	3.6	7	8	1
4.	2.9	7	9	-
5.	3.28	7	8	-
6.	2.65	7	8	-
7.	2.7	7	8	-
8.	3.5	7	8	-
9.	3.26	7	8	-
10.	3.5	7	8	-
11.	2.5	4	4	2
12.	2.49	7	8	2
13.	3	7	8	-
14.	3.6	7	8	-
15.	2.7	7	8	-
16.	2.9	7	9	-
17.	2.9	7	8	1
18.	2.8	7	8	-
19.	3.17	7	9	-
20.	3.53	7	8	-
21.	3.4	7	8	-
22.	3.1	7	8	-
23.	2.8	7	8	-
24.	3	5	8	-
25.	3.2	8	9	-
26.	3.6	7	8	-

#### 3.1. Responses at introduction of hydro birthing

As the new birth option (Hydro birthing) was introduced during their antenatal birth classes at first trimester, the mothers to be were delighted and many of them agreed in the beginning but due to the opposition in the family and spouse they lost interest due to fear and finally only 33

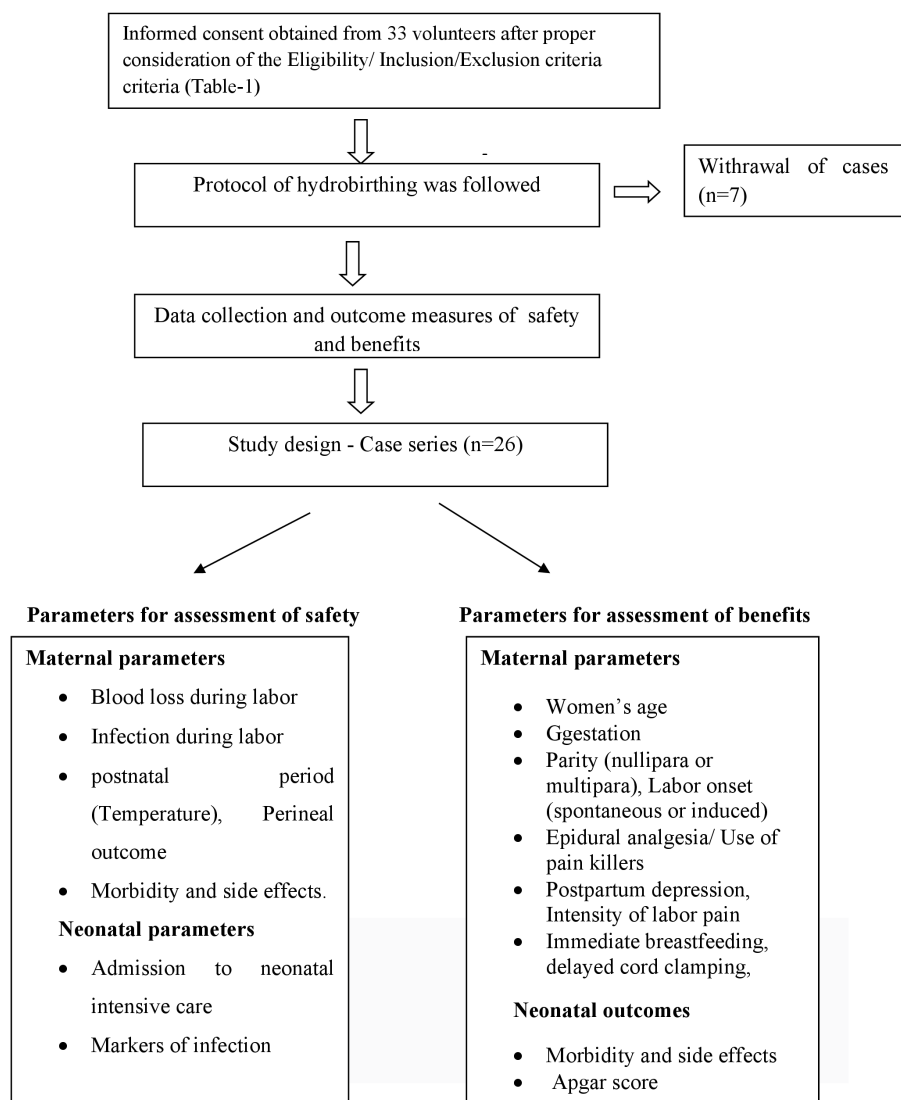
among them voluntarily accepted this birth option, consent was obtained from the pregnant women, spouse and family members and were included in the study based on the inclusion and exclusion criteria. 7 among the parturients who had given consent for hydrobirthing withdrew their consent due to fear and anxiety after getting into the water pool. Besides this, the classical obstetrical circles showed opposition as these opponents were afraid of possible complications such as aspiration of water, drowning of new born, Post partum blood loss, Hyper/Hypothermia of mother and child, infections etc. As the data and experience were scarce in this field, especially in India, their fears on safety concerns were quite understandable.

#### 3.2. Effect of hydro birthing on reduction of perineal damage

Previous published literature, emphasizes that perineal trauma is a common event affecting up to 90% of primy mothers and the incidence of episiotomy in modern day obstetrics is approximately 81%.<sup>14</sup> The same fact was confirmed by another study which has reported through its findings that nulliparous women were 8.8 times more likely to undergo episiotomy than multiparous women.<sup>15</sup> Upon comparing the study results of the published research works with our case series, it can be concluded that though the present study consisted of higher percentage of Primy mothers (75%) with average neonatal birth weight of 3 kgs, Asian ethnicity (100%) the perineal tear was very limited and most of them had 1<sup>0</sup>(50%), 2<sup>0</sup> (35%) perineal tears and only 3 among them had 3<sup>0</sup> perineal tear (Table 1). There was no need for episiotomy among any of the parturients who opted for hydrobirthing. In contrary, among 7 of them who withdrew their consent 5 of them had the need for Right medio lateral episiotomy(RMLE). The findings may contribute to the positive effect of hydrobirthing in preventing severe perineal damage.

#### 3.3. Effect of hydrobirthing on labor pain

The present study used verbal report as the single most reliable indicator of pain and the intensity was evaluated using a visual analogue scale (VAS) after the delivery. The Visual analogue scale showed that these women had very mild pain (Mean VAS score-1.9) during labor and they reported most satisfying birth experience (Table 1). One among the 7 parturients who withdrew her consent for hydrobirthing needed epidural analgesia. All other cases included in the study, did not need any epidural/spinal analgesics or pain killers during hydrotherapy. This may be due to the relaxing effect of warm water and the facilitated movement in its weightlessness and greater freedom of movement. Furthermore, immersing in warm water is proposed to create a calming impact, reduces the stress and relieves anxiety through the secretion of stress-



**Fig. 1:** Procedures followed in the study

related hormones such as catecholamines.<sup>16</sup>

#### 3.4. Effect of hydrobirthing on postpartum haemorrhage (PPH)

According to WHO statistics 25% of maternal deaths are due to PPH. The incidence of PPH is reported as 2% - 4% after vaginal delivery and 6% after cesarean section with uterine atony being the cause in about 50% cases. Every year about 14 million women around the world suffer from PPH.<sup>17</sup> Based on population-wide studies from well-developed countries, Miller et al., has concluded that the incidence of PPH after vaginal delivery ranges from 0.8% to 7.9%. The greater likelihood of PPH was being nulliparous women with a second stage duration of  $\geq 3$  hr.<sup>17,18</sup> Our

present study was consistent with the previously published results and did not report any post partum hemorrhage. The lower blood loss in water bath could be explained by the hydrostatic pressure in the tub or possibly by a facilitated control of third stage of labor.<sup>19</sup>

#### 3.5. Effect of hydrobirthing on labor induction

The World Health Organization (WHO) Global Survey on Maternal and Perinatal Health, conducted in 24 countries which included nearly 3,00,000 observations, showed that 9.6% of them were delivered by labor induction. WHO Global Survey on Maternal and Perinatal Health. Induction of labor data. World Health Organization: Geneva; 2610. The rate of induction of labor has greatly increased in the past 10 years. In this study, among the 26 parturients 22

**Table 2:** Effects of hydro birthing on maternal parameters

S. No	Age	Gravida	Pain score (1-10)	Perineal tear (10-40)	Post partum Hemorrhage (PPH)	Eidural/spinal analgesics	Labor induction
1	29	2	1	2	-	-	-
2	27	1	2	1	-	-	T.Miso
3	27	1	2	1	-	-	T.Miso
4	28	1	1	2	-	-	-
5	28	1	1	1	-	-	-
6	32	1	1	1	-	-	-
7	30	2	2	2	-	-	-
8	27	1	0	2	-	-	T.Miso
9	32	1	1	2	-	-	-
10	26	1	1	1	-	-	-
11	31	1	2	3	-	-	T.Miso
12	26	1	2	2	-	-	-
13	33	2	2	3	-	-	-
14	27	1	0	2	-	-	-
15	27	1	5	2	-	-	-
16	34	1	1	1	-	-	-
17	26	2	1	1	-	-	-
18	28	2	1	1	-	-	-
19	28	2	4	1	-	-	-
20	32	2	6	1	-	-	-
21	25	1	3	1	-	-	-
22	37	2	2	1	-	-	-
23	23	1	4	2	-	-	-
24	24	1	2	2	-	-	-
25	25	1	2	1	-	-	-
26	34	2	3	3	-	-	-

of them had no need for labor induction and their labor progressed well by good uterine contractions and only 4 women had the need for Tablet Misoprostol orally for Labor induction (Table-1). The buoyancy of water enables a woman to move more easily which can facilitate the neuro-hormonal interactions of labor, alleviating pain, and potentially optimising the progress of labor. Besides these facts, water immersion may be associated with improved uterine perfusion, less painful contractions, a shorter labor with fewer interventions.<sup>20</sup>

### 3.6. Effect of hydrobirthing on APGAR scoring and NICU admissions

It is widely recognised that a low Apgar score, commonly defined as a score less than 7, is associated with increased risks of neonatal mortality, morbidity, infections, asphyxia related complications, neonatal hypoglycaemia, and respiratory distress and long term outcomes.<sup>21–23</sup> In our case series, Mean Apgar score at 1 minute and 5 minute was 7 and 8 respectively which indicates normal healthy newborn (Table-2). There was no incidence of aspiration, drowning or mortality. This has been explained by diving reflex which is an inhibitory primitive reflex. Aspiration is

said to occur only when the diving reflex fails.

In our present study one among the neonate was referred to neonatal admission unit due to respiratory distress. However, respiratory conditions have been reported to be the most common cause for admission across all births, and studies reveal the actual rates of respiratory admissions were higher among non-waterbirths.<sup>21</sup> The overall neonatal admission rates were low, due to the fact of relatively low-risk population being studied. In order to validate the causes for admissions in greater detail would require a far larger sample.

### 4. Study Limitations

The case series contained only a very small number of cases which is regarded as a major limitation and therefore the significance of the maternal and fetal outcome measures could not be assessed statistically. The missing documentation of measured values accounted for smaller number of variables for the analysis of maternal and neonatal parameters as the study was not performed prospectively.

## 5. Conclusion

The present case series has demonstrated the advantages of hydrobirthing such higher rates of intact perineum with mild perineal tears and no need of episiotomies, lower blood loss, lesser use of painkillers after delivery and non-use of spinal/epidural analgesics during labor. Hence we conclude that Hydrotherapy during labor and child birth can be well integrated along with classical birth management measures provided with consistent obstetric emergency drills to assure quality care. Further future large-scale study with women who volunteer for hydrobirthing is warranted to generalise this concept and for its acceptance among the various obstetric teams especially in developing countries like India.

## 6. Acknowledgement

The authors would like to express their gratitude to Dr. Vijayasathyan Ramanathan MBBS, MMed, PhD, FECSM, Consultant Sexual Medicine, Bloom health care, Chennai, Tamil Nadu for his intense support and guidance in editing and publishing this study.

## 7. Source of Funding

None.

## 8. Conflict of Interest

The authors declare that they have no conflicts of Interest

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**Cite this article:** Gautham K, Devi S. A case series on maternal and neonatal outcomes of hydrotherapy during labor and childbirth. *Indian J Obstet Gynecol Res* 2020;7(2):257–262.