

Water immersion during labor and/or birth: A review of the literature
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Literature Summary: Results & Outcomes

Author & Year	Journal Issue & Page #	Research Question	Number of Study Subjects	Variables	Outcomes
Siegel, P., 1960	<u>OB/GYN</u> 15, 660-61	Does bath water enter the vagina?	10 women, 5 in last 2 wks of preg, 5 in 1 st 3 days of puerperium	Potassium iodide added to tub water. Lukewarm water- avoid evaporation. Parity (para 2- para 10).	No instance of tampon contamination.
Cefalo, R. & Hellegers, A., 1978	<u>American Journal of Obstetrics and Gynecology</u> 131(6), 687-94.	Cardiovascular and respiratory effects of induced hyperthermia in the ewe and the fetus.	Sixteen Dorset ewes	Maternal-fetal temperatures, cardiovascular parameters of the fetus, umbilical vascular resistance, uterine circulation, maternal and fetal acid-base parameters	-with the earliest elevation of fetal temperature, there was a significant rise in fetal heart rate -Under induced hyperthermia, maternal cardiac output increased. There was a demonstrated set point at which time cardiovascular collapse occurred. Temperatures greater than 1.5 degree Celcius above baseline experienced a sudden drop in cardiac output. -maternal blood pressure did not change significantly w/increased temperature. -temp difference between fetus and mother appeared to be maintained through heat exchange across the placenta
Brown, C., 1982	<u>Journal of Nurse-Midwifery</u> 27(10), 13-16	None- Descriptive report of hydrotherapy, theoretical background, use in labor, & clinical applications.	N/A	N/A	Hydrostatic & hydrokinetic effects. “...a warm tub bath seems to be a useful, noninterventionist technique to add to the list of comfort measures for labor.”
Odent, M., 1983	<u>The Lancet</u> , December 24/31, p 1476	None-report of 100 waterbirths attended by French obstetrician	N/A	N/A	-"water seems to help many parturients reach a certain state of consciousness where they become indifferent to what is going on around them." -Nearly all the women who enter the pool leave it before the birth -"water seems to facilitate the development of the mother-infant relationship." -"(we) have found no risk attached either to labour or to birth under water.."

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					-“immersion during the second half of the first stage of labour is helpful.” -“(we hope) that (other experiences would confirm) immersion in warm water is an efficient, easy, and economical way to reduce the use of drugs and the rate of intervention in parturition.”
Milner, I. 1988	<u>Nursing Times</u> 84(1), 39-40	None- Descriptive report from Hinchingbrooke Hospital, Hunting- donshire	N/A	N/A	Great emphasis on freedom of movement during labor. Possible decrease uterine contractions if enters tub too early. In tub 1-1/2 hrs or longer. Hydration important. Women relax more & lose their inhibitions. Multigravida women who used water for pain relief tended not to use anything else.
Katz, V., et. al., 1990	<u>Obstetrics & Gynecology</u> 75(2), 147-151	Is there a difference in mobilization of extravascular fluid (relief of edema) in patients who utilize bedrest compared to those who use water immersion?	Eleven (6 primi- gravidas)	Independent: bedrest, bathtub, immersion. Dependent: maternal heart rate, blood pressure, weight, hgb, hct, serum sodium, potassium, osmolarity, prolactin, prostacyclin 6-keto PG, urine sodium, potassium, cratinine total protein, osmolarity, specific gravity, free water clearance	Diuresis after the immersion tank treatment was significantly greater than that after bedrest or bathtub. (diuresis secondary to increased renal blood flow and central volume expansion as fluid moved intravascularly) Serum Na., K, tot. protein, osmolarity, and serum creat. conc. were unchanged. During immersion-induced mobilization of extravascular fluid, the levels of renin, aldosterone, angiotensin, and vasopressin drop, whereas atrial natruiretic factor and dopamine increase.
Aderhold, K. & Perry, L., 1991	<u>MCN</u> 16, 97-99	None- Descriptive report- level 3 hospital- 1800 births/yr, 50- 60% high-risk	N/A	Use of hydrotherapy in labor and post-partum	Aids in rotation of occiput posterior presentation by allowing woman to assume various positions while supported by water. Immersion often speeds dilation in woman who is actively laboring (4-5 cm before entering tub).
Rosenthal, M. 1991	<u>The Female Patient</u> 16, 44-50	None- Continuing medical education	N/A	N/A	Water Immersion most beneficial for the “exhausted” woman in labor and/or one whose labor is “dysfunctional”. “Helpful to a majority of women”
Walden- strom U. & Nilsson, C., 1992	<u>Birth</u> 19(2), 57- 63	Investigate the effects on maternal and infant outcomes of women taking a	Retro- Spective analysis of 89 women took a	Independent: time interval from SROM to delivery, IP antibiotic treatment for maternal	Women in the control group used more analgesia and oxytocin stimulation during labor and delivery than those in the bath group. NO statistical difference was observed between the groups for

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		warm tub bath after SROM at term.	warm tub bath after SROM-matched control group of 89	fever. Dependent: Apgar scores, neonatal morbidity, neonatal LOS, maternal C/S & vacuum extraction.	Apgar scores at 1 and 5 minutes. Differences in neonatal morbidity and length of hospital stay were not statistically significant. No effect of the duration of bathing on neonatal outcome was demonstrated. “Warm water is a valuable means to achieve relaxation and pain relief during the first stage of labor.”
Burns, E. & Greenish, K., 1993	<u>Nursing Times</u> 89(8), 47-49	Prospective-Intent to treat	302 used tub (labor &/or birth), 302 did not	Parity, EDD, cervical dilation upon entering the tub, length of time in pool, delivery in water or not, opinions about tub, state of perineum after delivery, use of analgesia	The number of women with intact perinial membranes identical. More second degree tears in pool group. Nine times more episiotomies in control group. Twice as many primigravidas using the pool received no pharmacological pain relief compared to those who used pain medication. In multigravid group, 3/4 used no other pain relief methods. Anecdotal evidence describes how calm babies born under water appear to be.
Rosevear, et al, 1993	<u>The Lancet</u> 342, pp1048-49	None- personal practice findings- Bristol, UK	n/a- 80 waterbirths since Sept 1991	Time immersed in water	In 2 of 80 births, neonate developed grade 3 hypoxic ischaemic encephalopathy. Mothers in pool 2 1/2 & 4 1/4 hrs.
Schorn, et al, 1993	<u>Journal of Nurse-Midwifery</u> 38(6), pp 336-42	Can water immersion (WI) contribute to more efficient labors when compared with labors where WI is not utilized?	93 subjects, 36-41 weeks gestation, in active labor, intact membranes Prospective randomized controlled.	Cervical progression, contraction pattern, use of analgesics, length of labor, infection, vital signs, FHR	Average time in tub 30-45 min., NO significant difference in cervical dilation, contraction pattern, length of stay until delivery, method of delivery, or incidence of infection (maternal/neonatal).
Alderdice, F. et. al. 1995	<u>British Journal of Midwifery</u> 3(7), 375-382	None-survey report- Department of Health, England and Wales	219 sites for labor and/or birth in water; 8255 labor only in water; 4494 labor and birth in water	Site policies, problems for mothers, babies, or providers	Estimated mortality rate approx. 1.24 per 1000 births in water (95% confidence interval) Twelve babies died after mother labored and/or birthed in water- <i>none reported to be directly related to birth in water</i> . Fifty-one (51 out of 12,749) cases of NB problems: resp./circ. problems (30), infection (3), hypoglycemia (2), neurological problems (2), congenital abnormal (2), other (12).

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					Thirty-three (33 out of 12,749) mothers w/ serious problems: PPH (12), major perineal trauma (10), uterine infection (2), other (9).
Anderson, et al, 1996	<u>Journal of Obstetrics and Gynaecology</u> , vol 16, 326-330.	1. Is a warm bath in the first stage of labor associated with an increased risk of maternal and/or neonatal postpartum infectious morbidity? 2. Advantages and disadvantages of bathing during labor.	629 subjects 37-42 weeks gestation, spontaneous labor, uncomplicated pregnancy, singleton, cephalic presentation Prospective study- March thru May 1994, Boras, Sweden.	All infectious morbidity (mother & child), time from onset of labour & ROM until delivery, need for analgesia, incidence of vacuum extraction, c/s rate, episiotomy rate, maternal blood loss, Apgar scores	NO significant differences regarding rate of operative delivery, labor augmentation, incidence of episiotomy, duration of 2 nd stage and hospital stay. Significantly longer duration 1 st stage w/ WI (7.1 hrs cp 5.1 hrs). Greater maternal infectious morbidity w/ WI (endometriosis 3.2% cp 1.3%, UTI 1.6% cp 0.6%)- uneventful recovery w/ 1 treatment period. NO difference in neonatal infectious morbidity. Greater use of paracervical block in WI group.
Burke, E. & Kilfolyle, A., 1995	<u>Midwives Journal</u> , January, p 3-7	Retrospective comparative study of water birth and bedbirth	50 water births and control group of 50 bedbirths	Cervical dilation, state of membranes, AROM vs. SROM, length 1 st stage, length of 2 nd stage, state of perineum p delivery, analgesia in labor, neonatal assessment, interventions in labor	-overall incidence of perineal trauma higher in bedbirth group -more intact perineums in waterbirth group -mean Apgar scores were the same for both groups -no women in the waterbirth groups received any other intervention in their labour -when questioned, 100% felt their contractions were easier to cope with once they entered the tub; 98% of multips said it was easier than previous land birth; the women's comments "highlight women's desire to be in control and to move freely, and the self-satisfaction at giving birth naturally without drugs."
Hawkins, S., 1995	<u>Nursing Times</u> , 91(11), 38-40	Comparative study of colonization of infection rates in mother and baby	16 women delivered in water; 16 in control group delivered on land	Culture swabs from mothers and babies, various sites	-most women/babies showed no evidence of clinical infection -one delivery, Irg numbers of <i>pseudomonas aeruginosa</i> and <i>Acinetobacter sp.</i> Were isolated from the water -lack of adherence to the cleaning protocol for water births appeared to be an important factor .

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Kitzinger, S., 1995	<u>Birth</u> 22(3), 172-73	None- descriptive report from an attendee of the International Water Birth Conference in London in 1995	N/A	N/A	Report gave synopsis of reports from Austria, Belgium, Malta, France, Germany, Denmark, the United States, & Britain. "(the use of water) represents an approach to childbirth that enables the birthing woman to have autonomy. It changes the environment and the quality of interaction among all those involved."
Rush, et al 1996	<u>Birth</u> 23(3), 136-143.	The effects of whirlpool baths in labor	Intent-to-treat design, 785 subjects, randomized controlled. Nov 1991- May 1992	Pharmacologic pain relief, labor length, satisfaction, instrumentation, perineum, & infection.	Mean total time in tub = 54 minutes. NO significant differences found in pharmacologic requirements, birth position, rate of instrumentation & c/s, maternal/neonatal infection. Significantly more intact perineum in WI group. Maternal satisfaction high w/ WI and continuous labor support.
Johnson, 1996	<u>British Journal of Obstetrics and Gynaecology</u> , vol 103, 202-208.	N/A- thorough review of fetal breathing- "Birth under water- to breathe or not to breathe".	N/A	N/A	PGE2 & adenosine increase 24-48 hrs before spont. Labor-inhibits fetal breathing. Lung fluid removal @ birth by adrenaline induced re-absorption across alveolar epithelium. The diving response. Environmental cooling. Hypercapnia stimulates breathing.
Odent, M., 1997	<u>Journal of Nurse-Midwifery</u> 42 (5), 414-416	None-consideration of the physiologic effects of immersion in relation to the process of parturition.	N/A	N/A	Immersion causes redistribution of blood volume, increased venous return to thorax occurs. This stimulates release of atrial natriuretic peptide (ANP), which inhibits the release of vasopressin. "Recent evidence indicates that blood volume expansion stimulates the release of oxytocin.." Poses questions for the providers offering water immersion during labor Recommendations: timing of entering tub (active labor), do not restrict PO fluid intake, water temperature 37 degrees Celcius or lower, immersion time in tub no greater than 2 hours.
Robertson, et al, 1998	<u>American Journal of Obstetrics & Gynecology</u> 178(6),1215-1221	Is there an association between water baths during labor and the development of	Retrospec- tive study. Identified 244 cases of chorio/endome	Length of labor, operative delivery, parity, augmenta- tion, vaginal exams, time from first exam to	Water bathing during labor IS NOT associated with the development of chorioamnionitis-endometritis.

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		chorioamnionitis or endometritis?	tritis & 244 controls without, at term. 110 of cases and 97 of controls participated **note No underwater births.	delivery.	
Gilbert, R & Tookey, P., 1999	<u>BMJ</u> vol 319, 483-487.	To compare perinatal morbidity for babies delivered in water with rates for babies delivered conventionally (not in water).	Surveillance study (of consultant paediatricians) and postal survey (of all NHS maternity units). British Isles, England & Wales. Babies born between 1994-1996. 4032 deliveries.	Labor, delivery, use of water, baby's condition, diagnoses, treatments post delivery, admission to special care nursery	The similarity in perinatal mortality and morbidity in low risk women suggests that delivery in water does not substantially increase adverse perinatal outcomes. No deaths were directly attributable to delivery in water.
Geissbuhler & Eberhard, 2000.	<u>Fetal Diagnosis and Therapy</u> , vol 15, 291-300.	Prospective, observational study. Frauenfeld, Switzerland.	7,508 births from 11/1991 to 5/1997, including 2,014 waterbirths, 1,108 Maibirthing stool births,	Perineal injuries, blood loss, neonatal birth outcomes, use of analgesics, birth experience perceived by mother.	With careful monitoring & birth management, feared complications did not occur. Episiotomy rates were lowest after waterbirths. Infections of the neonate after waterbirths were not more frequent than in other birth methods. Lower blood loss and lower use of painkillers in waterbirth group. <i>Alternative birth methods introduce more caring into birth management, promote mutual respect, bring more comprehen-</i>

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				&2362 bed births.	<i>sion and Acceptance between parturients & OB team</i>
Eckert, Turnbull & MacLennan, 2001.	<u>Birth</u> , June, vol 28, 84-93.	In women in labor, does warm-water bathing reduce the need for pharmacologic pain relief more than no bleeding? Australia.	Randomized, partially blinded, controlled trial w/ 8 month follow-up. 247 pregnant women (137 warm-water bathing, 137 routine hospital care).	Use of pain relief during first stage of labor. Maternal complications. Interventions used in labor & del. Neonatal events.	In women in labor, warm- water bathing did not reduce the need for pharmaco- logic pain relief and did not affect maternal or postnatal outcomes.
Ohlsson, G. et. al., 2001	<u>Acta Obstetricia et Gynecologica Scandinavica</u> 80, 311-314	Ascertain if there were any detrimental effects of immersion in water during labor.	1,237 subjects from 3 OB units, intent-to-treat design Primary end-point=referral to NICU(612 cases/625 controls)	Independent: >=35 wks gest., singleton planned vag del, normal admission test, regular contractions, cervix at least 3-4 cm. Dependent: admission to NICU	<i>The primary end-point, referral to NICU, did not vary between cases and controls.</i> NO significant differences in groups: apgar <7 at 5 min., cephalic hematoma, fx clavicle, neonatal distress, tachypnea, neonatal jaundice, neonatal seizures. “...taking a warm tub bath during labor has no significant detrimental effects.”
Mackey, M. 2001	<u>Clinical Obstetrics and Gynecology</u> 44(4), 733-749	None-report history of use of water in labor and birth, current use, rationale for use, theoretical risks fetus/newborn/ mother, benefits neonatal/mater-nal	N/A	N/A	Considerations for use of water immersion during labor and birth: eligibility, contraindications, equipment, general recommendations, cleaning.