A Randomized-Control Trial to Test Breast Milk Odor/Taste on Preterm Infant Pain During Venipuncture

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Background

- Every year, an estimated 15 million babies are born preterm.
- To survive, these infants need to stay at the neonatal intensive care units, where they may experience numerous painful procedures during the first few days of their life.
- Repeated and prolonged pain exposure alters preterm infants' subsequent pain processing, physiological and behavioral stability, long-term developmental outcomes.
- Peripheral venipuncture commonly occurred in neonatal clinical practice and are important sources of pain in preterm infants.
- Neurodevelopmental studies have shown that olfactory, gustatory pathways and their neurophysiologic responses are present even at 28 weeks gestation.
- Studies suggest that the effects of single use of breast milk odor/taste on pain relief are still inconsistent.

Purpose

- We compared the effects of using breast milk odor/taste integration on pain in preterm infants across the peripheral venipuncture procedures.

Methods

- This is a prospective randomized controlled trial.
- Preterm infants (gestational age 28–37 weeks) needing venipuncture were recruited by convenience sampling and randomly assigned to treatment conditions: routine care, breast milk odor (BMO) + oral expressed breast milk (OEBM).
- Pain was measured by watching video recordings of infants undergoing venipuncture procedures and scoring pain at 1-minute intervals with the Premature Infant Pain Profile-Revised; physiological parameters (heart rate [HR], oxygen saturation [SpO_2]) by electrocardiogram monitors, and was be digitally sampled at 10-s intervals by computer.

Study Design

	Groups	Pre-test $Time_0$	Intervention	$Time_1$	Post-test $Time_2$	$Time_3$
Rand	Routine care	O_{11}	X_1	O_{21}	O_{31}	O_{41}
	BMO+OEBM	O_{12}	X_2	O_{22}	O_{32}	O_{42}

Rand: Randomization; X_1: Routine care include gentle touch, gently pat or verbal comfort;X_2: Breast milk odor (BMO) + oral expressed breast milk (OEBM); $O_{11\text{-}12}$: baseline outcome (phase0: before the start of procedures); $O_{21\text{-}22}$: outcome measurement at $Time_1$($phase_1$: disinfecting); $O_{31\text{-}32}$: outcome measurement at $Time_2$ ($phase_2$: venipuncture); $O_{41\text{-}42}$: outcome measurement at $Time_3$ ($phase_{3\text{-}8}$:10-minute recovery).

Results

Change in PIPP-R, HR, SpO_2 for treatment conditions predicted by GEE method's multiple liner regression (N=70)

	PIPP-R				HR				SpO_2			
Variable	B	SE	Wald c^2	p	B	SE	Wald c^2	p	B	SE	Wald c^2	p
Condition effects												
Condition 2 vs.1	0.04	0.22	0.03	0.865	0.03	3.30	0.00	0.992	0.18	0.49	0.14	0.705
Phase effects												
Phase 8 vs. Phase 0	4.94	0.56	76.92	<0.001*	4.90	1.96	6.25	0.012	0.46	0.33	1.93	0.165
Phase 7 vs. Phase 0	6.28	0.63	98.37	<0.001*	11.57	3.20	13.03	<0.001*	-0.79	0.63	1.55	0.212
Phase 6 vs. Phase 0	8.44	0.80	111.49	<0.001*	16.78	2.86	34.40	<0.001*	-1.79	0.81	4.89	0.027*
Phase 5 vs. Phase 0	9.39	0.82	132.45	<0.001*	23.51	3.03	60.25	<0.001*	-2.21	0.88	6.23	0.013*
Phase 4 vs. Phase 0	10.22	0.75	184.95	<0.001*	30.52	3.90	61.16	<0.001*	-2.97	0.83	12.65	<0.001*
Phase 3 vs. Phase 0	11.47	0.72	254.97	<0.001*	34.42	3.55	93.98	<0.001*	-2.74	0.87	9.84	0.002*
Phase 2 vs. Phase 0	13.25	0.59	495.98	<0.001*	34.17	2.77	152.00	<0.001*	-1.89	0.64	8.60	0.003*
Phase 1 vs. Phase 0	11.39	0.60	360.30	<0.001*	26.54	2.79	90.75	<0.001*	-1.72	0.64	7.21	0.007*
Interaction effects												
Condition $_2$* phase $_8$	0.18	0.70	0.07	0.798	-5.25	2.64	3.97	0.046	-0.73	0.55	1.75	0.186
Condition $_2$* phase $_7$	-0.31	0.80	0.15	0.702	-3.26	4.06	0.64	0.422	0.87	0.70	1.54	0.215
Condition $_2$* phase $_6$	-2.00	1.03	3.78	0.052	-5.20	3.99	1.70	0.193	1.41	0.96	2.15	0.143
Condition $_2$* phase $_5$	-2.15	1.11	3.79	0.051	-8.88	4.47	3.94	0.047*	1.85	1.02	3.30	0.069
Condition $_2$* phase $_4$	-1.93	1.08	3.20	0.074	-10.17	5.33	3.64	0.056	2.49	1.00	6.22	0.013*
Condition $_2$* phase $_3$	-0.97	1.08	0.82	0.366	-8.44	4.72	3.20	0.074	2.01	1.04	3.74	0.053
Condition $_2$* phase $_2$	-1.90	0.93	4.15	0.042*	-8.00	3.89	4.23	0.040*	0.47	0.84	0.31	0.577
Condition $_2$* phase $_1$	-1.12	1.01	1.24	0.266	-0.31	3.84	0.01	0.936	0.16	0.90	0.03	0.862

Implications for practice

- The study suggests that preterm infants receiving BMO+ OEBM could significantly lower the infant's pain-score, and lower the changes of the HR during the venipuncture phase.
- The results can guide caregivers to alleviate preterm infants' pain during painful procedure by using breast milk odor/taste integration.
- By using the infant's sensory competences; clinicians could calm their pain, and HR across the venipuncture phase.