

Mother-infant signalling during breastfeeding: A randomised trial investigating the effects of a relaxation intervention in breastfeeding mothers on breast milk production, breast milk cortisol and infant behaviour and growth

N.H.M. Shukri^{1,2*}, J. Wells¹, F. Mukhtar², M.S. Lee², M. Fewtrell¹

¹Institute of Child Health, University College London, UK, ²Faculty of Medicine & Health Sciences, Universiti Putra Malaysia, Malaysia.
*nurul.shukri.12@ucl.ac.uk; n_husna@upm.edu.my

The signalling between mother and infant during breastfeeding is one of the prominent inter-relational mother-infant factors in early life. The baby can 'signal' his/her needs to the mother by his/her behaviour and the way in which s(he) feeds, and the mother can respond by producing different amounts of milk and altering the composition of the milk (Wells 2003). Maternal psychological state has also been recognised to influence milk ejection, thus, increased stress/anxiety can cause disruption of milk flow and milk volume (Stuebe *et al.* 2013). Conversely, milk ejection can be improved by relaxation therapy, and this has been shown in previous studies in pre-term infants (Feher *et al.* 1989; Keith *et al.* 2012). To our knowledge relaxation therapy has not been formally tested in mothers who are breastfeeding their healthy term infant. There are also many unexplored issues (psychological and physiological) in the signalling between mother and infant during breastfeeding. An experimental study to help address the research gaps by using a more robust methodological design (randomised controlled trial) was undertaken. The aim of this study was to identify the causal relationships between maternal psychological state (manipulated using a relaxation intervention) on breast milk (volume and composition including cortisol concentrations) and infant outcomes (behaviour and growth).

Pregnant mothers were recruited at antenatal clinics in Klang-Valley, Malaysia from March-December 2014. A total of 88 eligible mothers (primiparous healthy women) were recruited and written informed consent obtained. The second screening was done after delivery, and 64

healthy mothers (who were exclusively breastfeeding) and their infants (full-term baby weighing ≥ 2.5 kg at birth) were eligible. The target sample size was 56 infants and mothers, to allow detection of a 0.76 SD difference in milk volume between groups at 80% power with a significance level of $\alpha=0.05$; this is a biologically plausible difference based on previous studies on the effect of relaxation interventions on milk production in mothers of preterm babies (Feher *et al.* 1989; Keith *et al.* 2012). Participants were randomised into control (n=31) and intervention groups (relaxation therapy treatment) (n=33). Mothers were blinded to the randomisation process to prevent any influence on maternal behaviour towards relaxation therapy (e.g mothers in the control group may have sought to use some form of relaxation therapy). Mothers in the intervention group were asked to listen to a relaxation therapy audio-recording during breastfeeding on a daily basis for at least two weeks. Home visits were conducted when the baby was 2-3 weeks, 6-8 weeks and 12-14 weeks old to assess maternal stress and anxiety using the Perceived Stress Scale (PSS) and Beck-Anxiety Inventory (BAI) respectively. Infant behaviour was assessed using the Rothbath-Infant Behaviour Questionnaire. Milk volume was measured using stable isotopes at the first and third home visits. Breast milk samples (fore- and hind-milk) were collected during all home visits to measure macronutrient content and cortisol levels. Infant growth was assessed by weight, length and head circumference at all home visits.

Maternal stress scores were not significantly different between the groups at baseline ($p=0.423$), but were significantly different at the second ($p=0.011$) and third home visit ($p=0.029$) with significantly lower mean score for mothers in the relaxation group. Infant weight and body-mass-index (BMI) were not significantly different at baseline but weight gain and BMI of infants in the relaxation group were significantly higher at later home visits; $p=0.003$ and $p=0.006$ at the second and $p=0.001$ and $p<0.001$ at the third home visit respectively. There was no significant difference in infant behaviour at three months or maternal anxiety at all home visits.

These preliminary results suggest the relaxation therapy had positive effects, reducing stress levels during the postpartum period. Higher weight gain and BMI

among infants in the intervention group suggests the intervention may have favourably altered milk composition or milk intake. This will be investigated in further analyses.

References

- Feher S.D.K., Berger L.R., Johnson J.D. & Wilde J.B. (1989) Increasing breast milk production for premature infants with a relaxation/imagery audiotape. *Pediatrics* **83**(1), 57–60.
- Keith D.R., Weaver B.S. & Vogel R.L. (2012) The effect of music-based listening interventions on the volume, fat content, and caloric content of breast milk—produced by mothers of premature and critically ill infants. *Advances in Neonatal Care* **12**(2), 112–119.
- Stuebe A., Grewen K. & Meltzer-Brody S. (2013) Association between maternal mood and oxytocin response to breastfeeding. *Journal of Women's Health* **22**(4), 352.
- Wells J.C.K. (2003) Parent–offspring conflict theory, signaling of need, and weight gain in early life. *The Quarterly Review of Biology* **78**(2), 169–202.