Infant and Maternal Factors Influencing Breastmilk Sodium

Among Primiparous Mothers

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Introduction

Perceived Insufficient Milk Supply (IMS) is one of the major barriers to breastfeeding, and the delayed onset of Lactogenesis Stage II (LS-II) is a contributing factor. LS-II refers to the period after birth when a woman’s milk volume increases. In most women, this volume increase occurs within the first 30-40 hours postpartum, but it is considered delayed if it does not occur within 72 hours after birth. LS-II is accompanied by an increase in the volume of milk secreted, as well as changes in the breast milk itself. Breast milk sodium levels decrease while lactose levels increase, which corresponds to the closure of the tight cellular junctions of the lactocytes, signaling that LS-II has begun.

The aim of the study was to identify which birth events and infant or maternal factors are related to breast milk sodium levels in first time mothers. Using sodium as a marker, researchers measured the concentration in breast milk samples and related them to different factors that have already been associated with delayed LS-II. The goal was to gain additional insight into the effect of those factors on the LS-II marker breast milk sodium.

Subjects and Methods

A total of 252 mothers were included in the study, out of 410 eligible candidates. These mothers were first time mothers over the age of 18, with an infant born beyond 37 weeks gestation and weighing at least 2,500 grams, and there was no infant/maternal separation greater than 24 hours. Mothers who fit the criteria and agreed to participate filled out questionnaires at day 3 and week 2, and were interviewed by a Lactation Consultant over the phone at week 6. A 0.5 mL sample of breast milk was taken on day 3, frozen, and tested for sodium concentration.
The questionnaires looked primarily at infant factors such as breastfeeding and latch assessment, breastfeeding frequency, and irritability at the breast. The maternal factors were obtained through chart review and included maternal diseases, medications, breast surgery, and also birth events such as vaginal or cesarean delivery, length of labor, and use of labor medications and augmentation.

Results

The factors that were found to be related to breast milk sodium concentration were maternal age, gestational diabetes status, insulin use, ethnicity, and breastfeeding frequency. The presence of gestational diabetes increased the risk of elevated breast milk sodium levels. The mean breast milk sodium levels associated with mothers with gestational diabetes was 58.18 mmol/L, compared to 41.49 mmol/L in women without gestational diabetes.

Higher breastfeeding frequency was also associated with lower breast milk sodium. The number of breastfeeds per 24 hours was further broken down into subcategories: 0-4 times, 5-6 times, 7-8 times, 9-10 times, and 11 or more times. The mean breast milk sodium level decreased in a linear manner as the number of feeds per 24 hours increased. The mean breast milk sodium in the 0-4 times/24 hours group was 54.31 mmol/L, compared to 46.13mmol/L in the 7-8 times/24 hours group and 35.26 mmol/L in the 11 or more/24 hours group.

Discussion and Conclusions

Although no single measure can determine that LS-II has been initiated, a decline in breast milk sodium was observed, indicating that LS-II was probable. Previous research has suggested that milk removal may not be necessary for the establishment of LS-II, as the mechanism is
driven heavily by hormone shifts initiated after birth. However, for some of the primiparous mothers in this study, frequent milk removal was necessary to close the lactocyte cell junctions.

Sodium may have an inhibitory effect on breast milk synthesis, participating in a feedback inhibition loop that keeps milk production low. In this study, breast milk sodium levels on day 3 were associated with breastfeeding practices at both week 2 and week 6. The lowest level of breast milk sodium was on day 3, suggesting that LS-II was initiated, and thus a mother is more likely to still be exclusively breastfeeding at weeks 2 and 6.

In this study, a higher number of breastfeeds per day was associated with a lower concentration of breast milk sodium, which was further associated with a longer duration of exclusive breastfeeding. The American Academy of Pediatrics currently recommends that mothers breastfeed 8-12 or more times in a 24 hour period. Therefore, interventions to promote breastfeeding should focus on promoting early, frequent feeding.

Bibliography:
