Breastfeeding reduces procedural pain in infants: A review of the literature

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ABSTRACT
Pain-induced stress in infants undergoing painful procedures, such as heelstick and venepuncture, has been found to cause both short and long term detrimental effects. Because it is not desirable for infants to have potent medicinal analgesia, researchers have sought other methods of pain relief that are effective. It has been found that breastfeeding during heelstick or venepuncture provides significant analgesia for infants. Maternal holding has also been found to offer some pain relief. This review looks at some of the studies that have revealed these findings.

Key words: analgesia, breastfeeding, infants, maternal holding, pain.

INTRODUCTION
Poorly managed pain which induces stress early in life has been shown to have short and long term detrimental effects. Heelstick and venepuncture are common painful procedures endured by infants. As pharmacological analgesia is not desirable, it is vital that acceptable and effective pain relieving methods are used (1-3). Research has been carried out with both premature and full term infants regarding pain and increased stress. Although premature infants are more likely to undergo repeated painful procedures, this article will focus on near term and full term infants and the analgesic effects of breastfeeding. It is these infants with effective sucking skills who will benefit the most. Breastfeeding during painful procedures, such as heelstick or venepuncture, has a significant analgesic effect. Where breastfeeding cannot take place, maternal holding, though not as effective, will reduce some pain.

DISCUSSION
The studies which were reviewed examined pain management in infants and the analgesic effect breastfeeding has during heelstick or venepuncture. Most of these used randomised controlled groups. Some used controls such as infants swaddled in cots (1,2), while others compared breastfeeding with other forms of possible pain relief, such as oral glucose solution (3,4). Some used maternal holding (4,5), and some used a pacifier; with holding (5), or without holding (2).

The studies used a variety of tools to assess pain in infants. These included the Neonatal Facial Activity Coding System (4), the Neonatal Infant Pain Scale (2,3), crying (1,4,5), grimacing (1), and physiological parameters such as heart rate (1,2,4,5), respiratory rate (2,3), blood pressure and oxygen saturation (5,6). The majority of the studies were performed while infants underwent heelstick procedures (1,2,5,7) while one used venepuncture (3) and one did not stipulate (4). All of these studies demonstrated that infants’ pain responses while breastfeeding were reduced significantly compared with the control groups. In some cases pain responses were virtually eliminated completely (1,2). While all studies found that breastfeeding significantly reduced pain compared to no intervention, some studies using glucose in the control groups produced controversial results (2,3). However, as some studies included both term and preterm infants, less efficient breastfeeding skills in the preterm infants could inhibit the pain relieving effects of breastfeeding (2,3). Moreover, for glucose to be effective the dose needs to be large, introducing its own risks. In addition, the possibility was raised that glucose may have a sedative rather than an analgesic effect (2,3). Therefore, glucose as pain relief for mature infants is a less desirable option than breastfeeding. Although pacifiers were used only in control groups, pacifier use for term infants was cautioned against by one set of authors due to the association between early pacifier use and the reduced duration of breastfeeding. The concern was that mothers included in the trial could see pacifiers as a means of comforting her infant, whereas breastfeeding empowers the mother to comfort and calm her infant (5).

It is not known what components of breastfeeding are most responsible for the analgesic effect. Breast milk contains tryptophan, a precursor of melatonin which increases beta endorphins that may procure pain relief. However, simply administering breast milk to the baby does not provide the same analgesic effect as breastfeeding (3). Various authors propose that during breastfeeding, the combination of smell, taste, suck, touch, seeing and hearing, and the closeness of the infant's mother, saturates the senses, thereby reducing pain (2,3,5).

Although pain is a necessary physical warning to preserve life, and crying is an infant's means of communication, pain-induced crying in infants has been linked to many negative physiological effects (2,3,6-8). Crying that has been induced by pain has been shown to have significantly stronger amplitudes than crying induced by fussing or hunger (6). Studies have shown that cardiovascular function, metabolism, and intracranial pressure can all be affected by pain and crying in infants (3,6,7). Short term compromise induced by pain include; increases in heart rate and blood pressure, a drop in pulse pressure which may impair circulation to the brain, a decrease in arterial oxygen levels, changes in blood flow pressure in the brain (3,6,7), and a rise in cortisol levels (6,7). Physiological stress as measured by cortisol will rise and continue to rise as crying time increases (6,7). High levels of cortisol begin to act as an immunosuppressant which may impair the infant's ability to fight infection (6). Pain-induced crying may also activate a negative stress induced biochemical cascade, indicated...
by elevated levels of renin and aldosterone. In addition, a temporary but significant rise in the blood white cell count induced by vigorous crying may lead to a false diagnosis of infection, followed by unnecessary antibiotic therapy (6,8). Interestingly, one report has shown that even mild crying increased the white blood cell count substantially (6). Research is increasingly attributing long term adverse effects to stress that occurs early in life, even at low levels. These effects can include an increase in pain sensitivity during further procedures in infancy, and this heightened sensitivity to pain may continue through to adulthood (1-3,6).

Although the option to breastfeed during painful procedures must be the mother’s choice, it needs to be an informed choice. The findings that breastfeeding significantly reduces pain should be explained to the mother prior to any painful procedure. However, if this has been given and the mother still prefers not to breastfeed, or the infant is not wanting to breastfeed or is being fed with formula, then being held by the mother will still produce some analgesic effect (5). This may be further enhanced by skin to skin contact where possible, which has also been shown to have some analgesic benefit (9,10). Additionally, if the breastfed infant is held close to the mother’s breast, breast milk odour has also been demonstrated to have a calming effect with pain response indices and cortisol levels reduced (5,7). These options reduce or eliminate the physiologically harmful act of crying and at the same time allows the mother to be actively involved in comforting her infant through a procedure that she too may otherwise find distressing.

Despite the large body of evidence recommending breastfeeding for pain relief during heelstick or venepuncture, there still appears to be a gap between awareness of this, and implementation. Although no risks to the infant have been identified with this practice, ongoing fears appear to remain. Fears voiced by health professionals are, a mother may drop her infant, the infant may choke, and the infant may associate pain with breastfeeding. None of these concerns have been substantiated (2,3,6). Others have expressed the belief that the infant is best left in their cot if sleeping as they don’t always wake. While this may be true, it is impossible to predict which infants will wake and which will not. However, of very real concern to health professionals involved in collecting blood samples from infants is the risk of harm to themselves. This is due to the often awkward positions required to access the infant’s heel when held by the mother. Therefore, it is vital that time is taken prior to the procedure to ensure that any risk that may contribute to gradual process injury of the collector is averted. In a hospital setting the bed can be adjusted to the correct height for the collector, or if the mother is seated in a low chair, could be asked to move from the chair to the bed. In all settings, as mothers are generally well women, instruction can be given to manoeuvre their bodies, and therefore the infants, into a position to allow accessibility to the heel without risk of injury to the collector. Anecdotal evidence suggests that infants that are breastfeeding while undergoing painful procedures bleed more freely, reducing the time required for the collect. Therefore, this may compensate for the time required to reposition the mother and infant for the safety of the collector.

CONCLUSIONS

Crying induced by pain has been shown to have adverse effects on infants, not only in the short term, but in the long term also. Research has clearly shown that breastfeeding is a safe and effective analgesic intervention to reduce pain during painful procedures such as heelstick or venepuncture. If breastfeeding is not possible, then being held by the mother has also been shown to produce some analgesic effect. Mothers should be informed of these options prior to these procedures being performed on their infants.

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REFERENCES


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