

Effects of Lavender Essential Oil on Infants with Neonatal Abstinence Syndrome: A Case Study

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BACKGROUND

Neonatal Abstinence Syndrome (NAS) is a diagnosis used to describe the withdrawal symptoms an infant displays after the abrupt cessation of intrauterine exposure to drugs following birth. The incidence of NAS in the US was 6.5 per 1000 births in 2016, and those infants spent an average of 16 days in the NICU⁶. Recent trends have been exploring non-pharmacological methods for pain and stress management in order to reduce the negative neurological effects of toxic stress induced by the withdrawal process⁵.

Symptoms of NAS can include difficulty sleeping, poor feeding, excessive crying, jittery movements, and neurological and gastrointestinal disturbances⁵. Common treatments for NAS include morphine, Tylenol, and non-pharmacological treatments such as music therapy, kangaroo care, infant massage, and breastfeeding⁵.

There are several studies that document using essential oils (EO) on infants^{1,2,3,4}. *Lavandula officinalis* (Lavender) oil was the most common EO used for non-pharmacological pain management due to its calming and mildly sedative effects. Lavender EO has antibacterial and antimicrobial properties, as well as a calming and sleep-inducing scent¹. Previous studies have discovered that lavender EO is more effective for pain relief and reducing time spent crying than breastmilk or amniotic fluid¹. Other positive outcomes for lavender EO treatment include reduced stress and crying, less fluctuation in vital signs, and improved sleep for healthy term infants^{2,3,4}.

PATIENT HISTORY

Baby A is a female infant born at 36 weeks gestation. Baby A was exposed to benzodiazepines early in the pregnancy followed by 100 mg methadone per day for the remainder of the pregnancy when her mother started a methadone maintenance program. Duration of benzodiazepine and date of initiation of methadone program are unknown. Urine, cord blood, and meconium tested positive for both drugs. Baby A was admitted to the NICU for hypoglycemia, hyperbilirubinemia, and monitoring of methadone withdrawal. She presented with signs of NAS at 48 hours of life, including jittery movements, hypertonicity, emesis, and increased crying. Her parents were present daily throughout her NICU stay.

RESEARCH QUESTION

What are the effects of lavender essential oil on reducing crying and facilitating sleep for infants with Neonatal Abstinence Syndrome (NAS)?

METHODS

The EO treatment was prepared by applying two drops of lavender EO on a 4x4 gauze square and enclosing it in a resealable plastic bag. Each EO treatment was replaced after 72 hours to ensure adequate potency. Baby A received her own individual EO sample to prevent cross-contamination between rooms.

First exposure to lavender EO treatment occurred on day of life (DOL) #2 when the infant was in a calm, quiet alert state. Regular lavender exposure at care times was initiated when Baby A began demonstrating symptoms of NAS on DOL #3. Lavender EO treatment was administered 30 minutes before the first two care times of each nursing shift. Lavender EO was not administered for the second two care times of each shift as a control period.

During the intervention period, the open plastic bag with lavender was placed in the top right corner of the crib 30 minutes before the infant's care time. The lavender oil never directly touched the infant's skin. The EO treatment was removed following cares when the infant was asleep or calmly awake. This routine was continued until discharge.

Following care times, nursing assessed the infant using the Eat, Sleep, Console assessment. Data related to feeding, pain, and state regulation was collected retrospectively from nursing flowsheets. Significance of data was analyzed using a paired t-test.

Assessment: Eat, Sleep, Console (ESC)

The ESC assesses behavior-based symptoms of infants with NAS. It records feeding quality, sleep quality, and ability to be consoled in yes or no values. Scoring is then broken down into a 1-3 rank for ability to be consoled.

ILPQC MNO Infant Bedside Sheet	
Baby's Name: _____	Baby's Med Record #: _____ Date: _____
Time:	
ESC Assessment	
Poor Feeding due to NAS Y/N	
Sleeping <1 hour due to NAS Y/N	
Unable to Console within 10 minutes due to NAS Y/N	
Consoling Support Needed	
1: Unable to console on own	
2: Able to console with caregiver support within 10 minutes	
3: Unable to console with caregiver support within 10 minutes	

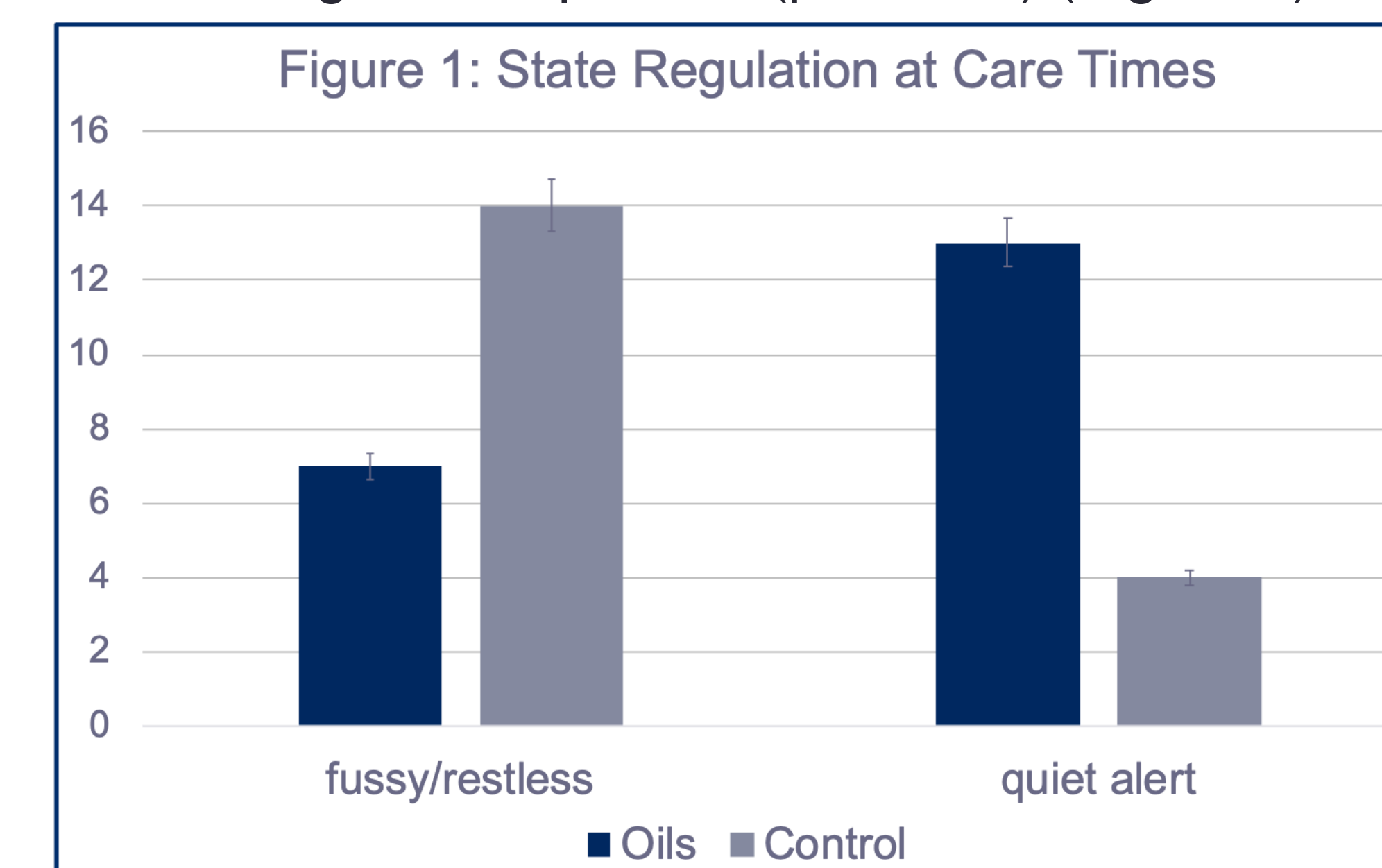
RESULTS

Baby A's length of stay was 7 days, which is 8.9 days shorter than the national average of 15.9. Her NAS symptoms were described as jittery, hypertonic, and irritable but consolable. In total, Baby A was administered lavender EO 20 times over the course of 5 days.

There was no difference in ESC scores between the intervention and control periods. The infant was scored NO for feeding difficulties, NO for sleeping <1 hour, and "soothes with support" at all care times. There was minimal difference between the two groups for NPASS pain assessment scores (Table 1).

Table 1	Average feeding P.O. (mL)	NPASS
Lavender (N=20)	33.5	0.346
Control (N=18)	30	0.33
P-value	0.173	0.94

Baby A ate more during aromatherapy than control periods, though the difference was not significant (Table 1). Nurses described Baby A's state regulation as quiet alert significantly more during aromatherapy than during control periods (p= 0.007) (Figure 1).



Limitations

- Small sample size is not generalizable to larger population
- Reports of infant state are somewhat subjective and can vary depending on the nurse
- Protocol only works for NICUs with single-occupancy rooms due to cross-contamination risk

Future Research

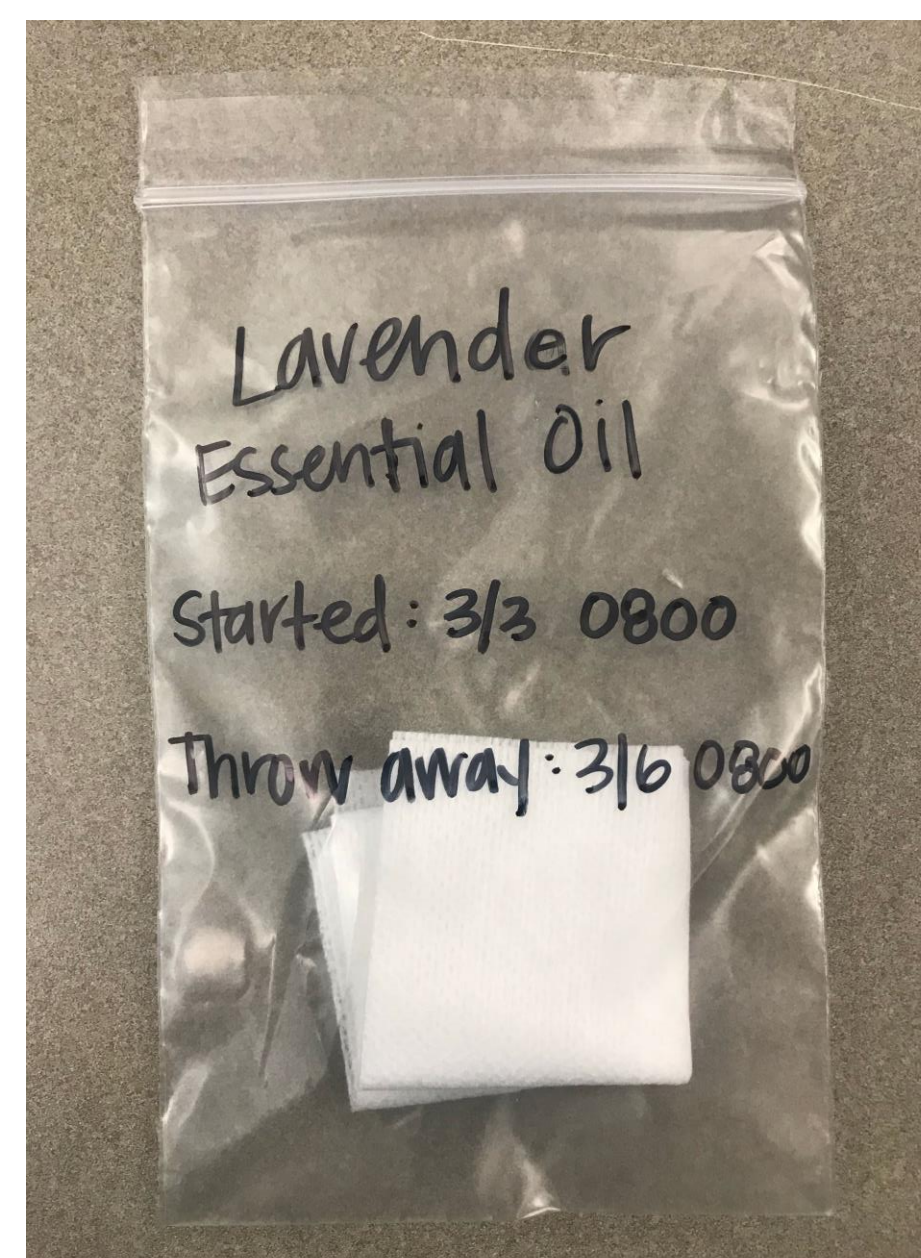
- Testing same protocol with a larger sample size and randomization
- Assessing change in cortisol levels in response to lavender EO
- Assessing the effects of lavender EO on long-term motor, cognitive, and developmental outcomes

BOTTOM LINE FOR OT

Clinical OT practice: Lavender EO therapy may improve infants' state regulation and prepare them for ADLs such as feeding by helping them maintain a quiet, alert state. Lavender EO may be a feasible and safe treatment option in the NICU, and there were no adverse events reported in this case study.

Societal Needs: Lavender EO can be added to a hospital's list of non-pharmacologic stress management options for infants with NAS, which may help decrease the infant's toxic stress exposure related to a NICU stay.

Healthcare Delivery and Health Policy: Increasing the non-pharmacologic treatments available for infants with NAS has the potential to decrease infant length of stay and/or allow infant to room in with mother. Either option has potential to reduce healthcare costs for infants with NAS and decrease the financial burden on Medicaid. Use of essential oils in hospitals must follow a strict administration protocol approved by the individual hospitals.



REFERENCES

1. Ackan, E & Polat, S. (2016). Comparative effect of the smells of amniotic fluid, breast milk, and lavender on newborns' pain during heel lance. *Breastfeeding Medicine* 11(6) 309-311. DOI: 10.1089/bfm.2015.0174
2. Çetinkaya, B., Basbakkal, Z. (2012). The effectiveness of aromatherapy massage using lavender oil as a treatment for infantile colic. *International Journal of Nursing Practice*, 18. 164–169
3. Conlon, P. M., Haack, K. M., Rodgers, N. J., Dion, L. J., Cambern, K. L., Rohlik, G. M., Nelson, D. E., Barry, T. A., Ayres, S. J., & Cutshall, S. M. (2017). Introducing Essential Oils into Pediatric and Other Practices at an Academic Medical Center. *Journal of Holistic Nursing*, 35(4), 389–396. <https://doi-org.cuhsl.creighton.edu/10.1177/0898010116677400>
4. Field, et. Al. (2008). Lavender bath oil reduces stress and crying and enhances sleep in very young infants. *Early Human Development*, 84. 399-401. doi:10.1016/j.earlhumdev.2007.10.008
5. Ryan, G., Dooley, J., Gerber Finn, L., & Kelly, L. (2019) Nonpharmacological management of neonatal abstinence syndrome: a review of the literature, *The Journal of Maternal-Fetal & Neonatal Medicine*, 32(10),1735-1740, DOI: 10.1080/14767058.2017.1414180
6. Strahan, A. E., Guy, G. P., Jr, Bohm, M., Frey, M., & Ko, J. Y. (2019). Neonatal Abstinence Syndrome Incidence and Health Care Costs in the United States, 2016. *JAMA Pediatrics*. <https://doi-org.cuhsl.creighton.edu/10.1001/jamapediatrics.2019.4791>