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## Keywords

acupressure, acupuncture, neonatal abstinence syndrome, non-insertive acupuncture

## Comments

At the time of publication, Paula Gardiner was not yet affiliated with the University of Massachusetts Medical School.

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## CASE REPORT

## Non-insertive Acupuncture and Neonatal Abstinence Syndrome: A Case Series From an Inner-city Safety Net Hospital

非插入式针刺疗法和初生儿脱瘾综合征：市中心安全网医院的案例系列

Acupuntura no invasiva y síndrome de abstinencia neonatal: Una serie de casos de un hospital de la red de seguridad de zona urbana

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### ABSTRACT

**Objective:** We report on the safety of non-insertive acupuncture (NIA) in 54 newborns diagnosed with neonatal abstinence syndrome (NAS) in a busy inner-city hospital.

**Methods:** For this case series, a retrospective chart review was conducted. Data on participant demographics, number of NIA treatments, provider referrals, and outcomes of interest (sleeping, feeding, and adverse events) were collected.

**Results:** Of the 54 newborns receiving NIA, 86% were non-Hispanic white; 87% were on Medicaid, and gestational age ranged from 33.2 to 42.1 weeks. Out of 54 chart reviews, a total of 92 NIA sessions were documented ranging from 1 to 6 sessions per infant. Of the total number of treatments (n = 92), 73% were requested by a physician. Chart reviews reported that restless infants calmed down during NIA, babies slept through or fell asleep immediately following NIA, and better feeding was noted following NIA. There were no adverse events noted in the medical records.

**Conclusions:** This retrospective chart review shows potential for the use of NIA as an adjunctive treatment in newborns with NAS symptoms during hospitalization. More research is necessary to study whether the incorporation of NIA can result in positive outcomes in newborns withdrawing from narcotics.

### 摘要

**目标：**我们对患者较多的市中心医院内被诊断患有初生儿脱瘾综合征 (neonatal abstinence syndrome, NAS) 的 54 名初生儿接受非插入式针刺疗法 (non-insertive acupuncture, NIA) 的安全性提出报告。

**方法：**对于此病案系列，执行回顾性图表分析。收集与参与者的人口统计、NIA 治疗次数、提供者转诊介绍，及关注结果（睡眠、进食和不良事件）有关的数据。

**效果：**接受 NIA 的 54 名初生儿中，86% 是非西班牙裔白人；87% 接受医疗补助，孕龄从 33.2 至 42.1 周。在 54 次图表分析中，共记录 92 次 NIA 疗程，每名婴儿接受 1 次到 6 次疗程的治疗。在总治疗次数中 (n = 92)，73% 由医生安排执行。图表分析表明，烦躁的婴儿在接受 NIA 期间平静下来，婴儿入睡或在接受 NIA 后立即入睡，并且接受 NIA 后进食情况有所改善。病历卡未记录不良事件。

**结论：**此回顾性图表分析说明 NIA 用作住院治疗期间出现 NAS 症状的初生儿的辅助治疗的可能性。需要进行更多研究，以确定使用 NIA 是否对中断使用麻醉药的初生儿具有较好的疗效。

### SINOPSIS

**Objetivo:** Informamos sobre la seguridad de la acupuntura sin inserción de agujas (non-insertive acupuncture, NIA) en 54 neonatos diagnosticados con síndrome de abstinencia neonatal (SAN) en un concurrido hospital urbano.

**Métodos:** Para esta serie de casos, se realizó una revisión retrospectiva de las historias clínicas. Se recopilaban datos sobre las características demográficas de los participantes, el número de tratamientos con NIA, las derivaciones de los médicos y los resultados de interés (sueño, alimentación y acontecimientos adversos).

**Resultados:** De los 54 neonatos que recibieron NIA, el 86% eran blancos no hispanos; el 87% estaban afiliados a Medicaid, y la edad gestacional estuvo comprendida entre las 33,2 y las 42,1 semanas. De las 54 revisiones de las historias clínicas, se documentaron un total de 92 sesiones de NIA, con un intervalo de entre 1 y 6 sesiones por recién nacido. Del número total de tratamientos (n = 92), el 73% lo solicitó un médico. Según las revisiones de las historias clínicas, los lactantes inquietos se tranquilizaron durante la NIA, los bebés se durmieron durante o inmediatamente después de la NIA y se detectó una mejora de la alimentación tras la NIA. No se notificaron acontecimientos adversos en las historias clínicas.

**Conclusiones:** Esta revisión retrospectiva de historias clínicas muestra el potencial de uso de la NIA como tratamiento complementario en neonatos con síntomas de SAN durante la hospitalización. Es necesario seguir investigando para estudiar si la incorporación de la NIA puede ofrecer resultados positivos para el retiro de narcóticos en neonatos.

Neonatal abstinence syndrome (NAS) is an issue in communities where narcotics and illegal drugs are abused by pregnant women. There are a variety of withdrawal symptoms observed in babies with NAS.<sup>1</sup> Some of these symptoms include high-pitched prolonged crying, inability to be soothed, and poor feeding habits. Pain and gastrointestinal disturbances are commonly observed in babies with NAS.<sup>2</sup> These newborns often suffer from an inability to sleep due to hyperactivity and disruption of central nervous system function.<sup>3,5</sup>

Acupuncture is a practice used in traditional Chinese medicine that involves the insertion of needles into or on the surface of the body at strategically placed points along meridians or pathways of *qi*. There is clinical literature on the use of acupuncture for narcotic withdrawal symptoms in adults.<sup>5</sup> In addition, acupuncture and acupressure have been used in clinical trials for children to mitigate pain, nausea, and digestive disorders.<sup>6-8</sup> A recent study demonstrated that an auricular acupuncture protocol can be utilized in the NAS population.<sup>9</sup> Currently, there are 2 studies on newborns with colic that show acupuncture's beneficial effect on these symptoms.<sup>10,11</sup>

We conducted a retrospective chart review of newborns diagnosed with NAS admitted to the BMC Pediatric Ward from 5/26/2009 to 10/30/2010 who received NIA treatments. The New England School of Acupuncture (NESA) senior acupuncture students with preceptors are currently on the inpatient pediatric floor 1 day a week providing treatment to pediatric patients. Physicians and nurses make recommendations for newborns to be seen based on symptom presentation. Because NESA students rounded once a week in the pediatric inpatient unit, the preceptor was able to also identify infants who might be candidates for NIA treatment and obtain written orders from the covering physicians. In all cases, consent to treat was obtained from physicians. When parents were present, benefits and risks were explained to them and parental consent to treat was obtained. Some parents who saw another parent's newborn receiving the NIA also requested treatments. The NIA protocol consisted of stimulation of 7 acupuncture points. The same points were used on each baby. All points were located on the head or limbs, not requiring the baby to be undressed for the treatment. The baby was treated either lying down in a crib or while held. These points were *Baihui* (congestion and irritability), *Yintang* (congestion and relaxation), *Hegu* (pain and congestion), *Neiguan* (pain and calming), *Zusanli* (abdominal pain and digestion), *Sanyingjio* (digestive function and irritability), and *Yongquan* (relaxation and cramping).<sup>12,13</sup> Points were chosen based on their impact on symptoms commonly exhibited in the withdrawal process. Pressure was applied to each point with a *teishin* or finger for 5 to 10 seconds, depending on the style of the acupuncturist. A *teishin* is a small metal rod with a rounded tip used in certain styles of acupuncture to

stimulate the points through a brushing motion or by being held gently to the point.

Little is known about the use and safety of non-insertive acupuncture (NIA) for newborns with NAS. NIA involves the placement of the tip of a small *teishin* or finger on designated acupuncture points for 5 to 10 seconds. NIA has been used as an adjunctive treatment for newborns with NAS on the inpatient pediatric floor at Boston Medical Center (BMC). This is a retrospective chart review examining cases of newborns receiving NIA. Development of an extraction tool was an essential component for identifying themes in the charts and to recognize areas of improvement for future documentation. In this article, we assess the factors associated with feasibility and safety outcomes on newborns diagnosed with NAS following NIA.

## METHODS

A chart abstraction form was used to collect information on both mother and newborn, including demographics, sex of newborn, type of delivery, gestational age, birth weight, discharge weight, days of hospitalization, and feeding style. Information on number of NIA sessions, tolerance of NIA, and safety information came from chart notes that provided qualitative and quantitative data. These were documented by the acupuncturist following treatment. Data collection and analysis were conducted by a research assistant who received a list of newborns from the acupuncturists. Nursing and nutrition notes provided information about behavior and feeding patterns. This review was approved by the Institutional Review Board at BMC.

## RESULTS

The records of 54 newborns were identified for the specified time period and were included in the data abstraction. There were 157 newborns diagnosed with NAS during the time period; however, NESA students rounded once per week, accounting for many newborns not receiving the NIA. Characteristics of the babies receiving NIA are listed in the Table. A total of 92 NIA treatments were documented. The number of NIA treatments on each baby ranged from 1 to 6 sessions and depended on the length of stay and acupuncturist availability. Thirty-one newborns received 1 NIA session, 13 received 2 NIA sessions, 7 received 3 sessions, 2 received 4 sessions, and 1 received 6 NIA sessions. Of the total number of treatments, 67 (73%) sessions documented the request of a physician; 2 (2%) sessions documented that the nursing staff requested NIA. Twenty-three (25%) sessions did not indicate who requested the session. In addition, 2 mothers inquired about NIA to hospital clinicians.

The average maternal age was 28.1 years; the range was between 19 and 43 years. More than half of all mothers identified as non-Hispanic white. The vast majority (81%) of mothers were from Massachusetts, primarily from Boston and nearby suburbs. Lastly, 87% of the mothers were on Medicaid assistance.

**Table** Subject Characteristics of Neonatal Abstinence Syndrome Newborns Receiving Non-invasive Acupuncture

Category	N = 54 (%)
Sex of newborn	
Male	33 (61)
Female	21 (39)
Type of delivery	
Vaginal	32 (59)
Caesarean	22 (41)
Gestational age (wk)	
Median (range)	38.6 (33.2-42.1)
Birth weight (g)	
Median (range)	2995 (1315-4195)
Days of hospitalization	
Median (range)	20 (4-53)
Feeding style	
Formula feeding	52 (96)
Breastfeeding	0(0)
Not documented	2 (4)
Age of mother	
Mean (Range)	28.1 (19-43)
Race of mother	
Non-Hispanic white	46 (86)
Black/African-American	4 (7)
Hispanic	4 (7)
Country of origin	
United States, Massachusetts	44 (81)
United States, other states	5 (9)
Outside United States	2 (4)
Not specified	3 (6)
Health insurance	
Private	1 (2)
Medicaid	47 (87)
Medicare	5 (9)
Not available	1 (2)

Prescribed maternal medications included methadone and subutex, both used for narcotic dependence, psychiatric medications (benzodiazepines), and bronchodilators. Nonprescribed drugs mothers used during pregnancy were heroin, cocaine, marijuana, and nicotine (cigarettes).

Chart reviews revealed no reported adverse events (eg, change in vitals, bruising, rash) as a result of the NIA treatments. There were 3 recurring themes found in the observations of the newborns following treatments. First, 28 records documented that babies slept through the treatment or fell asleep immediately after treatment. For those who were already sleeping, 1 record revealed a deeper sleep following NIA. Second, the relaxing effects of NIA were especially prominent in babies who were agitated prior to treatment. Thirteen sessions done on restless babies documented a noticeable release of tension during treatment. These charts previously noted that the babies were difficult to console and irritable. Lastly, in nursing and nutrition notes, 8 records revealed babies had better feedings following NIA and had higher caloric intake in the days following. For 1 baby, the treatment resulted in a cessation of hiccups. Two other records noted babies with slower, more even breathing during and immediately

following the treatment.

Results suggest the feasibility of having this modality available to NAS babies; physicians, nurses, and other clinical staff readily made referrals. Because treatment was done at the bedside, took a short amount of time, and was seemingly acceptable to staff members and parents, it seems feasible to add NIA as an adjunctive treatment to usual care. Mothers who were approached by the acupuncturists also seem to find the method acceptable.

## DISCUSSION

Babies presenting with NAS require specialized care focused on alleviating symptoms of withdrawal. Very little is known about the use of NIA in newborns with NAS. Our retrospective chart review is the first to report on the use of NIA in a busy inner-city hospital. We present data that needs further rigorous study to demonstrate the safety and efficacy of NIA with newborns with NAS. This chart review is the first step to developing a study of feasibility, acceptability, and safety of NIA.

Although the literature on the use of NIA in newborns is scant, there is another case report that documented acupuncture ear points in a newborn with NAS.<sup>14</sup> The same authors also examined the use of auricular acupuncture in a sample of 5 newborns with NAS.<sup>15</sup> Furthermore, a randomized trial studied the use of ear seeds to deliver acupressure to newborns with NAS.<sup>9</sup>

There are clinical data on acupressure combined with massage for newborns. Chen et al used massage with acupressure treatments in 40 premature infants.<sup>16</sup> The benefit from this touch therapy was better digestion and increased weight gain. The goal was to influence nurses and parents to consider infant massage and acupressure treatments after discharge. Though the babies in this study were not diagnosed with NAS, prematurity is often observed in babies with NAS. In addition, poor gastric motility is a common observation in NAS. Newborn demographics revealed that the treatments were well tolerated by premature newborns and babies of small gestational age.

Restlessness, poor feeding, and irritability frequently are observed in babies going through drug withdrawal. In our chart review, we found that 8 records reported better feeding, 28 records documented that babies slept through or fell asleep after NIA, and 13 records revealed more relaxed babies after NIA. Similar results are reported in a randomized control trial that found that newborns with colic receiving acupuncture had shorter periods of crying and less fussing overall compared to controls.<sup>11</sup> The demonstrated successful use of acupuncture for reducing irritability and as a digestive aid may present a plausible mechanism of action for NAS babies who often display hyperactivity and poor feeding. These studies are important in establishing the efficacy of acupuncture for neonates. More research is necessary to deter-

mine whether the incorporation of NIA can result in positive outcomes such as better sleeping, feeding, and, in turn, easier withdrawal from NAS.

During the NIA sessions, 2 parents inquired about NIA for the baby and several parents were taught the NIA points. Including parents in the treatment process has the potential to positively impact bonding, particularly since inability to console the newborn combined with insecurity about ability as a parent can inhibit the bonding process.<sup>17</sup> Studies have shown that touch therapy has been useful in the clinical setting to encourage bonding between parent and newborn as well as to reduce time spent in hospitals.<sup>17</sup> NIA also can incorporate nursing and medical staff members to provide additional support to parents and families and strengthen clinician-parent relationships and parent-newborn relationships.

Acupuncture has been shown to carry a low risk of adverse effects when used correctly in the clinical setting.<sup>18</sup> The medical records of the newborns in this review did not reveal any signs of adverse effects. The literature estimates the rate of adverse events following acupuncture at 14/10000 treatments for adults.<sup>19</sup> A recent systematic review of acupuncture for children found that acupuncture is safe in a pediatric population when done by trained and licensed acupuncturists. Reported adverse events were minor, often resulting from poor delivery of acupuncture.<sup>20</sup> Our chart review reveals the safety and feasibility of incorporating NIA into clinical practice for neonates. It is important to emphasize these facts to parents and providers who are considering using acupuncture for their newborns, as safety is a serious concern.

Costs for additional or extra treatments are always an issue. NESAs students provided the NIA treatments during their rotation time in the pediatric unit so that there was no additional time or cost burden to the staff. Development of a protocol including NIA during hospitalization for NAS should include costs as well as determination of most efficacious dosage of the therapy.

There are several limitations in the findings of this case series. First, the information available in the medical record for each mother and baby varied in terms of detail of the NIA session and NAS symptoms. That our review did not reveal any adverse events related to the treatment does not eliminate the possibility of undocumented adverse events. Second, the acupuncturists were there only 1 day a week, therefore limiting access to NIA. Having an acupuncturist available 1 day per week resulted in some newborns being treated early in their hospital stay, while others who were hospitalized for an extended period of time may have received the treatment after a long duration of pharmacological interventions. Those who had longer lengths of stay had a greater chance of receiving the treatment more than once. In addition, although NAS scoring information was collected, there were missing data on the scores and inconsistency in reporting scores. The main goal of pharmacological therapy is to reduce the symp-

toms and subsequent scoring. It is unclear what role the NIA played in reducing the symptoms because the babies were on medications while receiving NIA. Clinicians hope that scores decrease with each day of life, but some charts noted a difficult day for the newborn, resulting in higher scores. Records of many of the babies receiving NIA noted decreased scoring between the day before treatment and the day after, but this could be due to a combination of pharmacological management and NIA. More research is needed to assess how NIA impacts NAS scoring.

Future research includes a prospective case control series to address potential limitations such as sample size and confounders. A larger randomized controlled study might also enable deeper exploration into variables such as a length of stay, potential cost savings, and birth weight. Future studies might examine whether mother-delivered NIA could be a facilitator of mother-newborn bonding.

Findings from this study provide preliminary data supporting the need for future research on the efficacy and safety of NIA in the newborn population. The feasibility of NIA in healthcare settings depends on the patient population served. In areas with a high prevalence of drug use, the availability of NIA for the newborn population exposed to drugs in utero could enhance the care delivered to these patients long term. By recognizing the enriching capacity of NIA for the newborn population with NAS, healthcare providers can continue to improve the specialized care these patients need.

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