The Effect of Osteopathic Manipulative Treatment on Neonatal Intensive Care Unit Length of Stay in Preterm Infants: A Meta-Analysis

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Abstract

Introduction: Prematurity is a major cause of neonatal morbidity and mortality. Osteopathic Manipulative Treatment (OMT) has gained attention as a potential complementary therapy to standard neonatal care to reduce hospital stay and healthcare costs. This meta-analysis analyzes the impact of OMT on neonatal intensive care unit (NICU) patients' length of stay (LOS).

Methods: Our literature search identified peer-reviewed randomized control trials (RCTs) and observational studies, comparing LOS between NICU patients receiving OMT as coadjuvant treatment versus standard care alone. Exclusion criteria included lack of OMT as a complementary therapy, a control group, or duplicate datasets. Risk of bias was assessed using RoB2 for RCTs and ROBINS-I. A quality-effects model was used to calculate pooled weighted mean differences (WMD) for LOS.

Results: Three (3) RCTs and 1 observational study (n = 1440) met inclusion criteria. OMT groups demonstrated a significant reduction in NICU length of stay (WMD = -3.17 days; 95% CI: -5.46 to -0.88). Heterogeneity was low (I^2 = 35%). All studies demonstrated a direction of effect favoring OMT.

Discussion: Our analysis showed a statistically significant reduction in hospital stay for preterm infants receiving both standard care and OMT, compared to controls receiving standard care alone. The large sample size was a strength of this study. A key limitation was the limited number of studies focused specifically on preterm infants.

Conclusion: OMT significantly reduced LOS for NICU preterm infants, with a pooled reduction of approximately 3 days. These findings suggest that OMT may offer a clinical benefit in shortening hospitalization in this population.

Introduction

- Prematurity is when a baby is born prior to 37 weeks gestation, increasing morbidity and cost from higher rates of associated medical disorders.[1]
- Preterm birth rates have ranged 7.5% to 12.5% in developed countries and continue to rise.[2]
- The criteria to discharge a premature baby consists of the resolution of clinical conditions related to body temperature, weaning, and oxygenation and the ability to orally feed with a positive trend in weight gain.[3]
- Osteopathic Manipulative Treatment (OMT) has been suggested to improve gastrointestinal function, decrease hospital stay, and improve nipple feeding in premature infants.[4]
- This meta analysis investigated the effect of OMT intervention on neonatal intensive care unit (NICU) LOS in preterm infants.

Methods & Materials

- A structured literature search was conducted to identify studies evaluating the effect of OMT on NICU length of stay (LOS).
  - Inclusion criteria:
    - Population: Preterm infants admitted to the NICU.
    - Intervention: Any form of OMT delivered by osteopathic clinicians.
    - Comparator: Standard of neonatal care in the absence of OMT.
    - Outcomes: LOS reported as a continuous variable.
    - Study design: RCT, observational.
    - Publication type: Full-text, peer-reviewed articles.
  - Exclusion criteria:
    - Case reports, narrative reviews, abstracts.
    - Studies lacking a comparator group, or not isolating OMT from other interventions.
    - Duplicated datasets of subset/secondary analyses.
- Risk of bias was assessed using Cochrane RoB2 for RCTs and ROBINS-I for retrospective studies.
  - Quality index values were subsequently assigned.
- Meta-analysis was performed using MetaXL.
  - Given low heterogeneity (Q = 4.60, p = 0.20; I^2 = 35%) and variation in study quality, the quality-effects model was applied to calculate weighted mean differences (WMD) in NICU LOS.

Results

- Four studies (N = 1440) were included in the meta-analysis.[1-4]
- **OMT was associated with a significant reduction in NICU length of stay: WMD = -3.17 days (95% CI: -5.46 to -0.88).**
- Heterogeneity was low: Q = 4.60, p = 0.20; I^2 = 35%.
- All study effects favored reduced LOS with OMT.

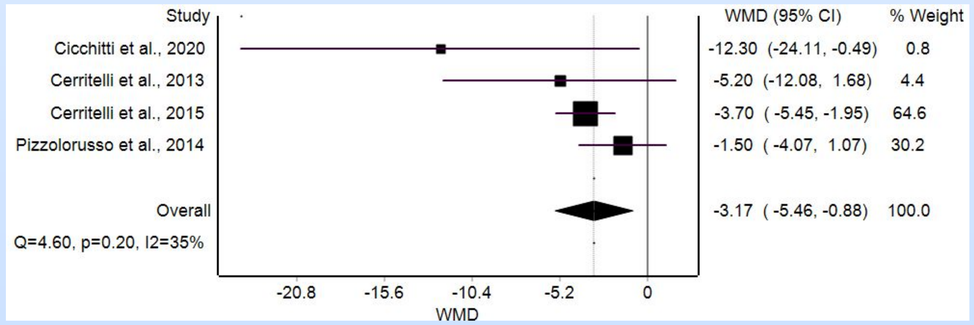

Figure 1. Forest plot of weighted mean difference (WMD) in NICU length of stay (LOS), comparing Osteopathic Manipulative Treatment (OMT) with standard care. Individual study effect sizes are presented as squares, with square size proportional to study weight, and horizontal lines representing 95% confidence intervals. Negative values indicate shorter LOS in the OMT group. The pooled effect was calculated using a random-effects model (WMD = -3.17 days; 95% CI: -5.46 to -0.88). Statistical heterogeneity was low (Q = 4.60, p = 0.20; I^2 = 35%).

Discussion

- This meta analysis of 4 studies demonstrated that OMT intervention reduced NICU LOS for preterm infants, revealing a statistically significant difference between patient groups who received standard care alone versus patients who received standard care and OMT.[1-4]
- The overall WMD of LOS was slightly negative at -3.17, with a 95% confidence interval of -5.46 to -0.88.
  - Confidence intervals did not cross zero, indicating a statistically significant difference in infants treated with OMT than those who were not.
  - Statistical heterogeneity was low, indicating consistency among the studies.
- This positive effect outcome is similar to studies performed in adult populations, specifically after surgical procedures, which has also previously shown decreases in LOS with implementation of OMT[5,6].

Conclusion

- This meta-analysis investigated the effect of OMT on NICU LOS in preterm infants.
- The WMD of -3.17 from this analysis of 4 studies demonstrated an average reduction in NICU LOS by 3 days, in patient groups receiving OMT as a complementary treatment to standard care, compared to infants who did not receive OMT.
- This meta-analysis suggested that OMT significantly decreases NICU LOS in preterm infants
- Larger RCTs are warranted to further validate these findings.

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