The Multiple Effects and Benefits of Massage with Preterm and Medically Fragile Infants

Author of Review:
Cindy Street
International Academy of Massage

Research Advisor:
Anna Varriano
International Academy of Massage
380 Forest Street
Ottawa, Ontario K2B 8E6
Abstract

In this paper, the multiple gains of preterm infant massage therapy are investigated and discussed. This paper reviews four studies focused on the benefits to immune systems, brain electrical activity improvements and maturity, reduction of prenatal depression in mothers, a gentle form of non-moving touch on key areas of the infant’s body (The Heart Touch Project) for premature infants in the Neonatal Intensive Care Units (NICU).

Additionally two papers were reviewed discussing the following benefits for potential underlying mechanisms for greater weight gain in massaged preterm infants, specific limb exercises, hospital cost savings, calorie consumption and sleep, insulin release and increased inulin-like growth factor -1 (IGF-1).
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Introduction

Skin protects us and allows us to interact with the world around us. As such, it is important to understand how touch can affect our health and well-being.

Pressure is a factor in how touch therapy can affect human health. Massage therapy (MT) has been shown to lead to weight gain in preterm infants when ‘moderate’ pressure is applied. A review of the numerous studies related to tactile stimulation and preterm infants indicates that infants who received moderate touch pressure type massage experienced greater weight gain (26% more) compared with infants who received light pressure stroking type massage.

Stimulation of skin pressure receptors increased vagus nerve activity. The research showed that only infants that exhibited increased vagus nerve activity exhibited greater weight gain. Direct stimulation of the vagus nerve can regulate gastric motility, enhance food digestion and increase the availability of nutrients to the preterm infant. Infants that received moderate pressure massage also appeared to be more relaxed and less aroused by hospital Neonatal Intensive Care Unit (NICU) noise and light, compared with the light pressure massaged group, which may have contributed to the greater weight gain. The studies are not suggesting more pressure is better and it is not advised to vigorously rub every baby treated. Approximately 14% of infants born in the United States are born prematurely, which is one of the leading causes of infant morbidity and mortality. This results in approximately 15.5 billion dollars in hospital costs per year. Following intensive care treatment, weight gain becomes the main criterion for hospital discharge. Thus many research studies have been designed to promote preterm infant weight gain including the use of massage therapy.
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Literature Review

A research study *A Randomized Placebo-Controlled Trial of Massage Therapy on the Immune System of Preterm Infants* (Ang, 2012); suggested that massage increased the blood natural killer cell (Nk) numbers in stable preterm infants in the NICU. In this research, MT was provided for five days per week until discharge of the infants. Blood absolute Nk cells, T & B cells, T cell subsets, and Nk cytotoxicity were documented in these infants through blood tests at the beginning and end of the research project. The other variables that were documented were weight gain, the number of acquired infections while in the NICU (immune system function), and length of stay at hospital. Abnormalities in Nk cell numbers/cytotoxicity affects increased susceptibility to infections. Nk cells provide antiviral effects and may play a role in antibacterial, antifungal and protozoa defense.

The conclusion of this research showed that MT may improve the overall outcome of infant immune health. This randomized study found that daily massage performed on stable preterm infants for a minimum of five days was associated with an increase in Nk cell cytotoxicity despite lower absolute Nk numbers, compared with the control group.

In another study titled *The effects of preterm infant massage on brain electrical activity* (Guzzetta, 2011); maturation and development of the preterm brain when MT is introduced in the first three weeks of life, led to development that was similar to the development level of full term infant brains. In this study, massage was started ten days after birth and continued for twelve days. EEG was performed around one to four
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weeks of age, before and after massage. The study suggested that massage intervention affects the maturation of brain electrical activity and favors a process more similar to that observed in-utero in full term infants.

The study called *Yoga and massage therapy reduce prenatal depression and prematurity* (Field, 2012) found that depressed women are more likely to deliver prematurely with lower infant birth weight, therefore putting the infant at risk. Yoga has been noted to decrease gestational prematurity. In this study, eighty-four prenatally depressed women were randomly assigned to yoga and massage therapy treatments. The control group received standard prenatal care. The purpose of this study was to determine the effects of yoga and massage therapy on depression of mothers and also neonatal outcomes. The women were followed for twelve weeks with biweekly yoga classes followed by massage sessions of twenty minutes each.

Results showed that both therapy groups (yoga and massage group) showed decreased depression, anxiety, and back and leg pain. Both groups benefited with neonatal outcomes regarding greater birthweights and gestational age, compared to the control groups that were not treated.

A second research project review of the same author *Potential Underlying Mechanisms for Greater Weight Gain in Massaged Preterm Infants* (Field, 2011) also focused on
preterm infant weight gain. This research found that through massage, the change in vagal activity explained 49% of the variance in the change in gastric activity, which resulted in 62% of the variance of the change in insulin. That the change in gastric activity was not related to the change in insulin suggests two parallel pathways via which MT leads to increased weight gain: 1) insulin released via the celiac branch of the vagus nerve; and 2) increased gastric activity via the gastric branch of the vagus nerve. MT may also lead to increased insulin and insulin-like growth factor-1 (IGF-1) and ultimately greater weight gain.

A research project conducted in Los Angeles called Touch and Massage for Medically Fragile Infants (Livingston, 2007) focused on a training program for parents using Hand Containment Massage (baby was swaddled with a small space exposed for massage) that took place in the NICU at the Children’s Hospital of Los Angeles. The Compassionate Touch Massage Program was used for babies with complex medical conditions. The intent of this program was to increased bonding and attachment behaviors with parent and child and decreased parental depression when they massaged their infants, along with the benefits to the infants who gained weight more quickly. The aims of the study were to develop, implement, and demonstrate feasibility and safety of a parent trained compassionate touch massage program for infants with complex medical conditions. Another aim was to conduct a longitudinal randomized control trial of hand containment massage versus standard care with no massage, in NICU with medically complex infants. During the program, infant pain, comfort, heart rate, parent depression and satisfaction were monitored. Certified massage instructors of “The Heart Touch Project” trained the parents and caregivers.
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The results showed increased infant weight gain, increased parental satisfaction and decreased parental depression.

Mentioned in a review called Preterm Infant Massage Therapy Research: A review, (Field, 2009) greater weight gain was also observed when infants receiving an added technique of passive limb movements which involved flexing and extending of limbs. In this research these movements, with massage, were conducted once a day. The results of the added limb movement treatment showed infant increased bone mineral density, thus leading to weight gain. The greater weight gain was associated with 3-6 days of shorter hospital stays. A recent cost-benefit analysis suggests a savings of approximately $10,000 per infant, or 4.7 billion dollars across the 470,000 preterm infants born each year who were treated with MT. Despite these benefits, a recent survey revealed that only 38% of NICUs offer infant massage or instruction to parents in infant massage in the United States, and even less (almost zero) in Canada.

Conclusion

The results of review papers conclude that there are many benefits to MT for both pregnant mothers and premature infants and both parents. The many benefits are both physical and emotional in nature and result in a significant savings in healthcare costs for both mothers and babies. It is not fully understood how MT helps with weight gain in premature babies. One hypothesis was that massage leads to greater consumption of calories. However, premature babies who received massage did not consume more formula or calories than the control group.
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babies. Another theory was that babies conserved more calories by increased sleep time. However, the massaged babies were more alert and spent more time in active awake states than the control neonates, suggesting that enhanced weight gain was not achieved by more sleep time or decreased activity.

In Canada, massage therapy work in the NICU hospital environment is not yet recognized by Ontario Healthcare Insurance Plan to be a cost saving or a cost benefit of great significance. In general, hospitals in the United States show a greater acceptance of this modality and MT in the NICU is available in some States.
References


