



**NON-PHARMACOLOGICAL STROKING INTERVENTION FOR  
PREMATURE INFANTS**

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<p><b>Article Info</b> <i>Received 15/11/2015</i> <i>Revised 27/12/2015</i> <i>Accepted 02/01/2016</i></p> <p><b>Key words:</b> Psychological health, Tactile stimulation, Premature infants.</p>	<p><b>ABSTRACT</b> Premature birth, when combined with low birth weight, denotes atypical development characterized by greater disturbance and delays in several areas, with neurological, sensory and functional morbidities increasing as the birth weight decreases. Differences in the times the sensory inputs are received seem to change the connectivity and the structure of the cerebral cortex, which justifies the poor neurofunctional performance of pre-term newborns (PTNBs) in tasks related to complex cerebral processes, such as attention and self-regulation. Studies have been conducted on the implementation of PTNB care programs to decrease environmental components that generate stress and to promote a more favorable context to infant development during hospital stay. The intervention programs take into account the daily care routine provided by the multidisciplinary health team or by the infant’s parents. The main goal is to offer an extrauterine environment that is adequate for an immature physiological system. This goal requires a modified sensory environment capable of producing more stable behavioral responses, which are compatible with the critical period of cerebral development of the PTNB7 . The responsiveness of newborns to tactile stimulation in the first days of life is greater than any other sensory modality. Furthermore, growth and cerebral maturity depend on neurotransmitters that are responsive to contact and gentle tactile stimulation. Tactile-kinesthetic stimulation stands out among the available interventions as an effective means to accelerate daily weight gain and to reduce the length of hospital stay of PTNBs.</p>
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**INTRODUCTION**

Full-term gestation is 40 week (range 37 to 42 week). Infants born before 37 week are preterm and have an increased incidence of complications and mortality roughly proportional to the degree of prematurity. Infants born < 34 week are considered moderate premature and those born ≥ 34 week and < 37 week gestation is considered late preterm. Infants born < 32 week are considered very premature, and those < 28 week are considered extremely premature [1,2].

The rate of preterm birth was 11.7% in 2011; 8.3% were late preterm and 3.4% were [premature], including 2% who were very premature.

Previously, any infant weighing <2.5 kg was termed premature. This definition is inappropriate because many infants weighing < 2.5 kg are mature or postmature

but small for gestational age; they have a different appearance and different problems. Infants < 2.5 kg at birth are considered low-birth-weight infants, and those < 1500 g are considered very low-birth-weight infants (VLBW) [2].

**ETIOLOGY**

In a given patient, the specific cause of premature labor and delivery, whether preceded by premature rupture of the membranes or not, is usually unknown. There are many known maternal risk factors, which may involve:

**Socioeconomic factors**

- Low socioeconomic status
- Mothers with less formal education



- Unwed mothers
- Cigarette smoking

#### **Past obstetric history**

- Prior premature births
- Prior multiple pregnancies
- Prior multiple therapeutic abortions and/or spontaneous miscarriages

#### **Current pregnancy-related factors**

- Pregnancy achieved by in vitro fertilization
- Little or no prenatal care
- Poor nutrition during gestation (and perhaps before)
- Untreated infections (eg, bacterial vaginosis )
- Multiple gestation
- Cervical insufficiency
- Preeclampsia
- Placental abruption

However, most women who give birth preterm have no known risk factors [2].

Skin-to-skin contact or kangaroo mother care (KMC) was described for the first time in 1978 in Mother and Child Institute in Bogotá, Colombia as an alternative method for LBW infants' care. It was considered and welcomed in the developed countries [10]. Studies suggest that skin-to-skin contact, which takes place in the first hours after birth, makes the mother and baby ready to establish a pattern of mutual interaction and coordination [11]. It has been shown that KMC for LBW infants could reduce mortality, severe illness, infection, and the length of hospital stay [12]. Furthermore, KMC can reduce the pain and lead to better tolerance of pain in preterm infants [13]. In addition, KMC facilitates mother-infant bonding, improves the acquaintance, and causes the mother to be more comfortable [14]. The purpose of this study was to determine whether the implementation of KMC (which requires the physical presence of the mother) would improve maternal mental health.

### **THE BENEFITS OF KANGAROO CARE**

Kangaroo care is a form of developmental care that has benefits for all newborns, especially those who are in the neonatal intensive care unit. Also known as skin-to-skin contact or kangaroo mother care, kangaroo care involves direct contact when a newborn is placed skin-to-skin on mom or dad's bare chest. Mom or dad may gently hold their baby where they can be rocked, cuddled and hear comforting sounds of their parent's heartbeat and voice. Even in the stressful environment of the NICU, parent and child can quietly bond and get to know one another. Kangaroo care is easy to do, inexpensive and highly rated by parents [6].

#### **2.1 Benefits for Baby**

Many of the benefits of kangaroo care to a newborn revolve around their feelings of safety, warmth

and comfort. Research shows greater bonding with parents and as a result more calm and less stress [3], which positively impacts their brain and emotional development [3].

#### **Kangaroo care can help NICU babies**

- Regulate their heart rate, breathing and temperature [4]
- Improve head circumference growth and weight gain [4, 6, 7]
- Stabilize their organ function and self-regulation abilities [3, 5]
- Experience less pain and less crying [8]
- Facilitate better sleep patterns [3]
- Avoid infections [4, 6, 7]
- Take advantage of improved nutrition from mothers increase in breastmilk production [3, 4]
- Be more willing to breastfeed [4, 5, 6]
- Enjoy a shorter hospital stay [9]

In addition to benefits that are observable in the NICU, research points to long-term advantages as well. Newborns who experienced kangaroo care in the NICU were more attached and bonded to their mothers over time. Babies were more alert after six months and their mothers were more attuned to their infant's cues and experienced less depression [3]. In early childhood, children receiving kangaroo care also show increased social competence, a positive sense of self and improved cognitive and motor development [3, 6]. These benefits are all signs of healthy brain development.

#### **When to Start**

Depending on your baby's condition, kangaroo care can begin immediately after delivery or may start after they are more stable. Even very small babies with major health issues or on a mechanical ventilator can benefit from these short sessions. Once your baby is stabilized, sessions should be at least an hour (even up to 24 hours though NICU policies vary) as anything less can be stressful for your baby [4]. Your nurse or other neonatal professional should be able to give advice about when a baby is ready for kangaroo care and help prepare parents for this special time together.

#### **Getting Ready for the Big Moment**

Kangaroo care usually requires a comfortable place to sit with several pillows for support and to help position the baby, though it can also be done standing up. Many hospitals provide a privacy curtain or screen to make it easier for a parent to undress from the waist up to prepare to hold their child. If a privacy screen is not available, parents may be offered a wrap or a stretchy shirt with a large neck opening that can be worn with space for baby to be tucked inside for privacy.

During kangaroo care, a baby will be undressed down to the diaper and placed directly on mom or dad's chest. Any wires or tubes will be carefully positioned, and parent and child will be covered with a lightweight blanket



or wrap to stay warm and for privacy. The nurse will likely take your baby's temperature several times to make sure they are maintaining their temperature and will probably watch the monitors pretty closely the first few times [3].

### **Mothers Bond with Their Babies**

The transition from pregnancy to a birth with complications and caring for a child in the NICU can be traumatic and stressful. Feelings of anxiety, fatigue, anger, guilt and depression, all emotions which can impact a mother's confidence to interact with their baby, are common [3]. Meeting the instinctual need to hold and soothe a newborn with kangaroo care helps mothers feel needed and re-connected to their baby, which melts away stress and leaves them feeling more fulfilled and empowered [4]. In addition, research shows mothers find it easier to bond with their infant, improving their ability to care for a medically fragile child [5, 7].

### **Dads Have a Role to Play too**

It is not uncommon for dads to feel like a visitor or spectator when their baby is in the NICU. Moms often spend more time in the NICU and have the role of providing breast milk. Kangaroo care can empower dads so they also feel like a significant person in their infant's life. Fathers also learn specific knowledge about caring for their baby, become a part of their schedule, and gain the nursing staff's confidence as well by participating in skin-to-skin care [5]. Kangaroo care is a great time for dads to practice practical skills related to caring for their child, while building a lasting bond.

### **TAC-TIC THERAPY**

Despite knowledge that preterm infants in intensive care are in distress and need to be provided with appropriate intervention, studies with ventilated babies are still rare particularly during their first weeks of life. This study tested the hypothesis that cutaneous stimulation in the form of TAC-TIC therapy, involving only light stroking and NOT massage or kinesthetic massage, has a mediating role in eliciting beneficial psychoneuroimmunological coactions in the ventilated preterm during the first week of post-natal life [14].

A repeated measure, counterbalanced design, was used to collect data twice daily for three consecutive days. This intervention was compared with a control condition consisting of a period of spontaneous activity during which the same infants lay alone with no intervention taking place. For the first time, monitoring facilities were made available for immunological, physiological and behavioral responses to be assessed simultaneously before and after intervention and before and after spontaneous activities. A one tailed t-test indicated that the cutaneous intervention resulted in significantly more episodes of beneficial coactions than matched sessions of spontaneous activity [14].

It is suggested that the sensory nerves endings in the skin receive the stimulation from the stroking actions; consequently impulses are being sent via afferent nerve fibers to the limbic system where the sensation is interpreted, by 68% of the neonates, as being comforting or not distressing [14].

This is a quasi-experimental study, it was conducted in 4 hospitals between January and June 2013, Khartoum, Sudan, and it involved 160 preterm infants randomly assigned into the case and control groups (80 neonates in each). Preterm infants in the control group received routine nursing care, while preterm infants in the case group received TKS for 3 periods, 15 minute per day for 7 constitutive days, in addition to routine care. Data was collected using a structured self-designed and validated questionnaire, checklist, and weighting scale. Weight gain and hospital stay were compared between the 2 groups [15].

Over the constitutive 7 days, the case group gained significantly more weight (1071gm versus 1104gm) compared with the control group (1077gm versus 1084gm) (1084.55±90.74) who gained only 6.9gm within the same 7 days without TKS treatment. The mean difference in weight gain was significant ( $p=0.00$ ). The hospital stay for preterm infants in the case group was significantly shorter (18.05±9.36 versus 25.47±10.25;  $p=0.00$ ) [15].

Tactile kinesthetic stimulation for preterm infants has a beneficial effect on weight gain and earlier discharge from hospital, which are sequentially efficient and cost effective [15].

Low Birth Weight [LBW] (1500gr ≤ Birth Weight ≤ 2499 gr) is one of the most serious health problems in neonates. These neonates need complementary interventions (e.g. tactile-kinesthetic stimulation) to promote development. Kinesthetic Stimulation (TKS) on physical and behavioral development of Low Birth Weight neonates [16].

This was a randomized controlled trial with equal randomization (1:1 for two groups) and parallel group design. Forty LBW neonates were randomly allocated into test ( $n = 20$ ) and control ( $n = 20$ ) groups. TKS was provided for three 15 minute periods per day for 10 consecutive days to the test group, with the massages consisting of moderate pressure strokes in supine and prone position and kinesthetic exercises consisting of flexion and extension of limbs. All measurements were taken before and after completion of the study with the same equipment (Philips electronic weighing scale with an accuracy of ±5 grams and Brazelton Neonatal Behavioral Assessment) and by the same person [16].

There was a trend towards increased daily weight gain, but without statistical significance. On the Brazelton scale, the test group showed statistically significant improved scores on the 'motor' ( $P$ -value <0.001) and 'regulation of state' ( $P$ -value = 0.039) clusters after the 10 days TKS [16].



TKS has no adverse effects on physiologic parameters and gives better adaptive behavior of LBW neonates compared to those without TKS [16].

## CONCLUSIONS

1. The strength of this study is in the initiation of a KTS program among Sudanese preterms despite the limited resources. Our study revealed a significant improvement in preterms weight and shortened hospital stay with modification of the KTS technique. Study limitations were, short time for data collection, and the results for measuring the effects could have been more realistic if measured over a longer time. The study was conducted in one state of Sudan; such studies could yield more useful results if conducted on a larger sample size all over the country, which is our suggested future strategy.
2. TKS has a beneficial effect on weight gain and earlier discharge from hospitals, which is sequentially efficient and cost effective. Further studies are needed to evaluate the effect of TKS in infants with birth weight less than 1000gm, and to apply this research in other areas of Sudan in order to gather more informative data.

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3. In the hospital, tactile and kinesthetic stimulation was shown to have a positive effect, contributing towards adjustment and self-regulation of behavior in the preterm newborn infant.

4. TKS has no adverse effects on physiologic parameters and gives better adaptive behavior of LBW neonates compared to those without TKS. These data provide evidence for the effectiveness of TKS in improving infant's behavior and a trend to enhance mature behavior.

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## CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

## STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

