The Effect of Kangaroo Care on Weight Gain of Premature Neonates in Hospitalized in Neonatal Intensive Care Units

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A major problem faced by premature infants is impaired physical growth in their weight. Therefore the aim of this study was to determine the effect of Kangaroo mother care (KMC) on weight gain of premature neonates. In a quasi-experimental study, 46 couples of mothers and premature infants hospitalized in two experimental and control groups were placed. In the experimental group, KC was given one time a day for 30 minutes after feeding for four weeks (with face-to-face training and booklet of KMC prepared by the researcher). The infant weight in two groups was measured at the time of four weeks by the electronic weighting scale with an accuracy of ± 0.10 gr. Data analysis using the Chi-square test, t-test, Mann-Whitney test was done. Infant's weight gain in the experimental intervention group was significantly higher than in the control group (p= 0.009) which was statistically significant. The application of kangaroo care by preterm infants' weight gain. Therefore, the study recommended the application of kangaroo care for all preterm infants as part of the routine daily care to preterm infants admitted to the NICU.

Key words: Premature neonate, weight gain, Neonatal Intensive care unit, Kangaroo Mother Care.

If the baby is born 37 weeks before the first day of the last menstrual period, he was called the premature infants that occur on the almost 5 to 15 percent of pregnancies; the occurring developments in the neonatal intensive care unit increased the survival of premature infants; despite this progress, the premature birth and low birth weight are the major cause of mortality in the first year of life and 85% of neonatal deaths is due to preterm birth; On the other hand, by increasing the survival rate of premature infants, has been created the increasingly concern about the developmental and psychosocial consequences of the infant; In the this relation, The early mother and infant of relationship of quality is the one of the factors that may exacerbate or reduce the potential negative effects of premature birth, especially in the field of evolutionary consequences of future; Today, about 13 million of the parent / infant per year has a preterm birth in the world that Of this total is related, 10 percent to UK, 7 percent to Australia, and 12.5 percent to the United States of America; the published reliable statistics in the subject is not available in the developing countries; approximately 400,000 infants are admitted annually to NICUs in the U.S; Annually, It takes 15.5 billion USD for admission fee, Iran is one of the regions with the
high incidence of premature birth and almost 10% of births constitute preterm infants. One of the influencing processes on the development of children is the modification of relationship of mother and infant in the hours or days after birth that recently has been the subject of studies. This time is very important for mothers; because it happens during this time influence on the subsequent behavior with children; the early intervention, is the key to the success of programs for parents of premature infants, because in the case of the stabilizing of the disruption of communication between parent and infant in the intensive care unit, it will be difficult to change it; the kangaroo care seeks to provide restored closeness of the newborn with mother or father by placing the infant in direct skin-to-skin contact with one of them. This ensures physiological and psychological warmth and bonding. The kangaroo position provides ready access to nourishment. This method has been implemented in the Brazil from July 2000; in 2003, the World Health Organization adjusted the Kangaroo care’s instructions and encouraged in developing countries, to its implementation; the incubators are often insufficient to meet the requirements or not clean enough; the purchase of equipment and spare parts, maintenance and repair are difficult and expensive. In such the condition, the proper care of premature infants is difficult and is common hypothermia and nosocomial infections, therefore, separate the infant incubators from mother and deny contacting them; the advanced technology leads care and survival of infants; However, financial, social and emotional burden enters the family, especially the parents; Kangaroo care is a technique practiced on newborn, usually preterm, infants wherein the infant is held, skin-to-skin, with an adult. Kangaroo care for pre-term infants may be restricted to a few hours per day, but if they are medically stable that time may be extended. Some parents may keep their babies in-arms for many hours per day. Kangaroo care, named for the similarity to how certain marsupials carry their young, was initially developed to care for preterm infants in areas where incubators are either unavailable or unreliable, Lawn and et al. in 2010 indicated that the Kangaroo care reduces the mortality among infants weighing less than 2000 g in the hospital, especially due to infection; the conducted studies in the Bangladesh has reported that the mothers are compatible faster postpartum by the Kangaroo care, Because the prevention of the Neuro-behavioral problems in hospitalized premature infants in the intensive care unit require to the medical interventions and supportive interventions alongside also the main reason for the premature infant mortality is the low birthweight; by considering the benefits of Kangaroo care in the premature infants and in infants weight gain, the present study was conducted to evaluate the Kangaroo care on weight premature infants.

**MATERIALS AND METHODS**

This research is a quasi-experimental study. The study population was composed of mothers of premature infants in the neonatal intensive care units of Sadooghi martyr and the social welfare hospitals of Yazd in 2012-2013. The sample size was considered with the confidence level and ability tests, respectively 80 percent and 23 mother-infant dyads for both groups; this study was carried out after permission from the ethics committee of the University of Welfare and Rehabilitation Sciences and maternal satisfaction as daily; the sampling was conducted through convenient sampling method. The standards of required for samples were: Lack of maternal employment in the rehabilitation and the health centers, lack of psychological illness and addiction in the mother, lack of hospitalization in the infant intensive care until, weighing less 2500 g, lack of congenital defect, infants with Apgar scores of 7 or more at birth, avoiding the use of mechanical ventilation; in case of unwillingness, the samples could be removed from the any stage of the study. Other removal measures consisted of mothers, who did not have any reason to stay alongside baby, mothers that after their admission of premature infants, their diagnosis of the sick was incurable, length of stay less than 4 weeks. To prevent the exchange of information between the intervention and control groups, were used time blocking until discharged the participant infants in the experimental intervention group, and then began the sampling of the infants in the control
group by the mentioned method and the sampling was performed for a period of 5.5 months. Demographic questionnaire of the mother-infant of completion was performed by using the medical records of infants and also to interviews; before the experiment, the researchers trained individual in kangaroo care individually to mothers as a face to face (within 2 days with questions and answers) and adjusted and offered the color booklet of kangaroo care to them; Due to the heavy workload in the morning shift, sampling was performed at 4 pm onwards; Then the kangaroo care was performed for 4 weeks, as the daily in the evening, after feeding and changing diapers, for 30 minutes while mothers were sitting at an angle of 45-60 degrees; So that infant, was placed a bare and only a hat and diaper, under cover of the mother in the direct contact with the skin of the chest and the abdomen (Incidentally before performing care, were asked to themothers take a shower); In this period, infants were weighed daily for 4 weeks. Thus, in the morning, has been weighed the infant’s weight without cover by the Seca digital scale (model of Germany) with the ±10 precision after calibration. It should be noted that all measurements was performed before and after the intervention by a scale. The weighing of control infants was performed also in the same method. In order to the statistical test for the data analysis was used software SPSS 20; the significance level has been p<0.05.

RESULTS

The Comparison of groups in terms of field and the possible intervening variable indicated that the two groups were statistically significant differences in terms of the confounding variables such as gender, age, age of the infant at the initiation of the experiment, weight, type of labor, education, etc. (Table 1 and 2). The mothers of the experimental and control

<table>
<thead>
<tr>
<th>Groups Variables</th>
<th>Experimental factors</th>
<th>Control</th>
<th>Total</th>
<th>(P-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>number</td>
<td>percent</td>
<td>number</td>
<td>percent</td>
</tr>
<tr>
<td>Mother’s education</td>
<td>Less than the Diploma</td>
<td>8</td>
<td>34.8</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Diploma</td>
<td>12</td>
<td>52.2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Associate Degree</td>
<td>1</td>
<td>4.3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>License</td>
<td>2</td>
<td>8.7</td>
<td>3</td>
</tr>
<tr>
<td>The Job of Mother</td>
<td>Housekeeper</td>
<td>23</td>
<td>100</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Employed</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>The number of abortions</td>
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<td>17</td>
<td>73.9</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>One</td>
<td>4</td>
<td>17.4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>two</td>
<td>1</td>
<td>4.3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Three or more</td>
<td>1</td>
<td>4.3</td>
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<table>
<thead>
<tr>
<th>Group</th>
<th>factor</th>
<th>Average</th>
<th>Standard deviation</th>
<th>(P-value)</th>
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</thead>
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<tr>
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<td>Age of infant( h)</td>
<td>68.87</td>
<td>24.33</td>
<td>0.508</td>
</tr>
<tr>
<td></td>
<td></td>
<td>65.739</td>
<td>20.743</td>
<td></td>
</tr>
<tr>
<td>experimental group</td>
<td>The birth weight (g)</td>
<td>1221.304</td>
<td>269.832</td>
<td>0.056</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1096.522</td>
<td>224.481</td>
<td></td>
</tr>
<tr>
<td>experimental group</td>
<td>Hospital stay (days)</td>
<td>36.956</td>
<td>8.171</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td></td>
<td>45.487</td>
<td>12.361</td>
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</table>
groups had no significant difference in terms of mean age, respectively (26.27 and 28.17 years), the rate of cesarean delivery (65.2 and 47.8 percent). The level of Education 12 (52.2%) of the mothers in the experimental intervention groups and 6 patients (26.1%) in the control group has been Diploma; the gestational age in both experimental and control groups did not show significant difference; In the experimental group 60.9 percent and in the control group 65.2% were boys. 15 people (65.2 percent) in the experimental group and 12 people (52.2 percent) in the control group were first child; the mean duration of hospitalization infants in the experimental group and the control group were respectively 36.956 and 45.478 days; the Mann-Whitney test indicates that the statistically significant differences had between the two groups in terms of hospital stay; the results suggest in both experimental and control groups before intervention, there is no significant difference between the mean weight premature infants in the experimental and control groups) p<0.05 ((Table 3). The results of the study showed that the first week of weight gain in the experimental and control groups; there is no significant difference after the intervention (p<0.05) but there is a significant difference in the weight gain on the second, third, fourth week, and also the total weight and total weight (Table 4)

**DISCUSSION AND CONCLUSION**

The results of the study show that after the first week of kangaroo care, there was no significant difference in the average weight gain in both experimental and control groups after the intervention, but there is the significant difference in the second, third and fourth and total weight in two groups; Moniem&Morsy (2011) have studied the effect of kangaroo care on the weight gain of preterm infants; They were weighed infants 4 weeks; the result of their study has indicated that before of the experiment, there was no the significant difference in the average weight in the two groups but there is the significant difference in the second, third and fourth and total weight in two groups; This study was consistent with the present study. The researchers stated that the increase of infants of weight is due to the kangaroo care because it leads to increased milk production (due to increase of hormones and the maternal sense of stimulation), the availability of milk for the baby and prevent hypoglycemia. Finally, according to the researcher’s suggestion, the kangaroo care should

<table>
<thead>
<tr>
<th>Table3 The comparison of the mean premature infants of weigh between the experimental and control groups before experiment</th>
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<tbody>
<tr>
<td><strong>Group variable</strong></td>
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<td></td>
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<tr>
<td>The birth weight (g)</td>
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<table>
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<tr>
<th>Table 4 The comparison of the mean premature infants of weigh between the experimental and control groups afterexperiment</th>
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<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>Weight gaining</td>
</tr>
<tr>
<td>First week</td>
</tr>
<tr>
<td>Second week</td>
</tr>
<tr>
<td>Third week</td>
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<tr>
<td>Fourth week</td>
</tr>
<tr>
<td>The total</td>
</tr>
</tbody>
</table>

be taken as part of routine care in the neonatal intensive care unit for premature infants. Furthermore, based on this study it can be concluded in addition to the above factors, other factors can be effective in the kangaroo position and growth of hormones in skin to skin contact such as reduction infant motion, sleep and his relaxation.

Keshavarzand et al. (2011) examined the effect of therapeutic touch on weight gain of premature infant. According to their study, experimental group infants had 10 g increase weightmore than infants in the control group and this increase was statistically significant; the several hypotheses have been proposed in the justification of the cause of the greatest weight of therapeutic touch; increase of mean duration of sleep in infants under therapeutic touch leads to increase the save more calories, stimulate pressure receptors, stimulating parasympathetic nerves, increased bowel movements and thus increase food intake and releases the further hormone insulin and also Field and et al. (2011) has noted this above reasons. This study is aligned with the present study and researcher concluded such as therapeutic touch, the kangaroo care is also an active participation of mothers in infant care. In addition, this care is also considered a kind of therapeutic touch. Because the skin contact of mother and infant can cause also the relaxation of infant, increased duration of sleep, the Parasympathetic nerve stimulation and increase of weight; In the other similar study by Borimnejad (2010) were examined the empowerment program of Mother-infant interaction and the weight gain of premature infants. The results showed that the average weight gain was significantly different the 2 months after the experiment between the control and test groups, (p=0.005) (16). The study was also performed in order to present study; the researcher concluded that kangaroo care can be considered as an empowerment program because in this method are being taught to mothers in order to effective relationship with infant and mothers play an active role and hereby is empowered her in order to take care of premature infants; Since often the avoid of premature infants of hospitalization is not possible in the intensive care units, it is recommended after premature birth, it is considered the preparing parent particularly mothers in effectively communicating with infant and provide the proper parental role of kangaroo care as the foundation of family-centered services. Mohammadzadeh and et al. carried out the study entitled advantages of kangaroo care in low birth weight less than 2000 g in Mashhad. They examined the confidence moms and Infants of hospital stay in kangaroo care group and the group receiving conventional care; The results showed that the experimental group of the confidence was more than the control group (p<0.001) and also a 10-day reduction was obtained in the length of hospital stay of these infants (p<0.001). The researchers have suggested the kangaroo method in the care of in low birth weight. In fact, the parents who spend more time with their newborn infants compared to nurses who care of several simultaneously; There are more opportunities in order to interpret symptoms and other baby requirements and show better performance (8). The results of this study are aligned with it. The high cost of infant care, the repeated hospitalization during the first year, is one of the consequences of preterm birth, So that the cost of care and the subsequent care for the premature infants with low birth weight is close to $48183 in Canada (17). In 2002, the cost of hospitalization in premature infants in the America has announced a 15.5$ billion and in 2005 the expenses for health services, training and rehabilitation associated with the preterm birth has announced 26.2 US$ billion (18). Ortenstrand and et al. (2001) examined the impact parental participation in the care of preterm infant during hospitalization and observed that the parental participation and their presence has a strong impact on the duration of hospitalization of the premature infants, so that were achieved a 5-day reduction in the length of hospitalization infants (19). In the study also, the comparison of the neonatal hospitalization period in the experimental group indicated a significant reduction relative to the control group, So that by the kangaroo care was observed the 11 days reduction in the neonatal hospitalization of the experimental group That was consistent with the results of Ortenstrand; The researcher concluded that kangaroo care in addition to reducing the duration of hospitalization of infants and reduce
the subsequent costs and leads reduction of hospital infections because in the other studies, a source of stress for parents, is mentioned in the long-term hospitalization of infants.

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