Effectiveness of supine and prone position on oxygen saturation in specific Respiratory disorders among the neonates admitted in NICU’s

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Introduction

Little hands and little feet, little toothless grins so sweet, little eyes that shine so bright, little arms to hug you tight. Everything’s little, except your joy, when you have a new baby. A new baby is like the beginning of all things – wonder, hope, a dream of possibilities

Every family looks forward to the birth of a healthy newborn. It is an exciting time with so much to enjoy. In some cases, though, unexpected difficulties and challenges occur along the way. Some newborns are considered high risk. This means that a newborn has a greater chance of complications because of conditions that occur during fetal development, pregnancy conditions of the mother, or problems that may occur during labor and birth. Some complications are unexpected and may occur without warning. Other times, there are certain risk factors that make problems more likely.

In the first months of life, babies are developing physically, mentally, emotionally and socially by exploring and experimenting with the things in the environment around them. Caregivers can help babies to safely explore their world by attending to and fixing aspects of babies’ environments that may be dangerous for them. Caregivers need to baby-proof not only a baby’s primary home, but also the car that the baby will be transported in, and the community of other homes and environments that the baby may visit and explore.

Life of neonate is precarious and caring them with safety is the aim in the reduction of their morbidity and mortality. Lack of facilities, high cost, poor economy, more load of pharmacotherapy will lead to adverse effects. Positioning the neonates will mitigate these deficiencies in simple, but in more compromised way. The researcher undertook this study with the same ambition.

Objectives

1. To assess the effectiveness of supine position on oxygen saturation in specific respiratory disorders among the neonates
2. To assess the effectiveness of prone position on oxygen saturation in specific respiratory disorders among the neonates
3. To compare the effectiveness of supine position and prone position on oxygen saturation in specific respiratory disorders among the neonates
4. To associate effectiveness of supine and prone position on oxygen saturation with selected demographic variables

Hypothesis

Null hypothesis ($H_0$):
There will not be significant relationship between supine position and prone position on oxygen saturation in specific respiratory disorders among the neonates

Alternative hypothesis ($H_1$):
1. There will be significant relationship between supine position on oxygen
saturation in specific respiratory disorders among the neonates

- \( H_1 \): There will be significant relationship between prone position on oxygen saturation in specific respiratory disorders among the neonates

- \( H_2 \): Prone position will be more significant than supine position in improving oxygen saturation in specific respiratory disorders among the neonates.

- \( H_3 \): Supine position will be more significant than prone position in improving oxygen saturation in specific respiratory disorders among the neonates.

**Methodology**

Research approach: Quantitative approach
Research design: Cross over study design
Sampling technique: Non-probability "Judgmental or purposive sampling technique"
Sampling size: 30

**POPULATION**
**SELECTION OF SAMPLE (SAMPLING TECHNIQUE)**
**NON PROBABILITY JUDGEMENTAL SAMPLING**

**CROSS OVER RESEARCH DESIGN**
(RANDOM ALLOCATION OF TREATMENTS)

- Treatment A (Supine Position)
- Treatment B (Prone Position)

**ANALYSIS**

Comparison of:
Treatments A&B (Supine Position & Prone Position)
Sequences (Group A & Group B)

**SEQUENCING OF TREATMENTS**
GROUP A: Treatment A First & then Treatment B
GROUP B: Treatment B First & then Treatment A

**INTERPRETATION**
Method of data collection

The final study was conducted from 06th December 2012 to 06th January 2013. Actual data collection was done on 30 neonates meeting the criteria for the study. 30 neonates with specific respiratory disorders admitted in NICU’s of selected hospitals were selected during the data collection period as per availability of subjects in the concerned department.

Samples were collected from NICU’s of two different hospitals

The following schedule was followed for data collection:

**Before Data Collection:**
- Prior permission for the study was taken from respective authorities of selected hospitals

**During Data Collection:**
- The researcher introduced self and informed subject’s parents about the nature of the study
- Informed consent was obtained for participation in the study from neonate’s parents.
- They were assured about the confidentiality of the data.
- Continuous monitoring of health status of Neonate was assessed and given highest priority.
- Available subjects (neonates) on the particular data collection day were divided in two groups (A & B) by randomization to administer different treatments (Supine or Prone) so as to achieve 15+15 in both groups, A & B.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>Group A</td>
<td>Supine position administered first</td>
<td>2 Hours</td>
</tr>
<tr>
<td></td>
<td>Wash out period</td>
<td>2 Hours</td>
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<tr>
<td></td>
<td>Prone position administered finally</td>
<td>2 Hours</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Group B</th>
<th>Prone Position administered first</th>
<th>2 Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Wash out period</td>
<td>2 Hours</td>
</tr>
<tr>
<td></td>
<td>Supine position administered finally</td>
<td>2 Hours</td>
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**Table: Description of Groups A & B**
- The obtained sequence (treatment) position, (Supine or Prone) as per random selection was given particular position for 2hours and recorded the data before and after administration of position.
- Given stabilization period of 2hr
- Then reverse the order position or cross over the treatments. (Group A was given prone and Group B was given supine)
- Oxygen saturation and other vital parameters were measured using Observation chart.

**Organization of study findings**

The collected data is tabulated, analyzed, organized and presented under the following sections:-

**Section I:** Distribution of subject with regard to demographic data

**Section II:** Deals with the analysis and interpretation of the data related to the effectiveness of supine position on;
- A. oxygen saturation in specific respiratory disorders among the neonates
- B. selected vital parameters in specific respiratory disorders among the neonates

**Section III:** Deals with the analysis and interpretation of the data related to the effectiveness of prone position on;
- A. oxygen saturation in specific respiratory disorders among the neonates
- B. selected vital parameters in specific respiratory disorders among the neonates

**Section IV:** Deals with the analysis and interpretation of the data related to the
effectiveness of supine position and prone position on;
A. oxygen saturation in specific respiratory disorders among the neonates
B. selected vital parameters in specific respiratory disorders among the neonates

**Section V:** Deals with the analysis and interpretation of the data related to effectiveness of sequence of supine position and prone position on;
A. oxygen saturation in specific respiratory disorders among the neonates
B. selected vital parameters in specific respiratory disorders among the neonates

**Section VI:** Deals with the analysis and interpretation of the data related to association of supine and prone position on;
A. oxygen saturation with selected demographic variables
B. selected vital parameters with selected demographic variables

**The major findings of the study:**

- 60% of the samples in group A were from age group 1-7 days, 33.3% of them from age 8-14 days and 6.7% of them were from age 15-21 days. 66.7% of them from group B were from age 1-7 days and 33.3% of them were from age group 8-14 days.
- In group A, 53.3% of them were males and 46.7% of them were females. In group B, 53.3% of them were males and 46.7% of them were females.
- In group A, 13.3% of them had birth weight 1501-2000 gm, 20% of them had weight 2001-2500 gm, 60% of them had weight 2501-3000 gm and 6.7% of them had birth weight above 3000 gm. In group B, 26.7% of them had birth weight 1501-2000 gm, 13.3% of them had weight 2001-2500 gm, 46.7% of them had weight 2501-3000 gm and 13.3% of them had birth weight above 3000 gm.
- In group A, 6.7% of them had gestational age 28-30 weeks, 13.3% of them had 31-33 weeks, 33.3% of them had 34-36 weeks and 46.7% of them had gestational age of 37 weeks and above. In group B, 13.3% of them had gestational age 28-30 weeks, 20% of them had 31-33 weeks, 20% of them had 34-36 weeks and 46.7% of them had gestational age of 37 weeks and above.

- In group A, 60% of them had normal delivery, 26.7% of them had caesarian and 13.3% of them had instrumental delivery. In group B, 40% of them had normal delivery, 33.3% of them had caesarian and 26.7% of them had instrumental delivery
- Regarding to APGAR score in group A, 6.7% of them had severe depression at 1 min and 93.3% of them had mild depression at 1 min. In group B, 26.7% of them had severe depression at 1 min, 66.7% of them had mild depression at 1 min and remaining 6.7% of them had no depression at 1 min. In group A, 20% of them had mild depression at 5 min and 80% of them had no depression. In group B, all of them had no depression.
- For 20% of them in group A and 33.3% of them from group B resuscitation method was used at birth
- Paired t-test was used to compare the SPO2 of neonates before and after supine position. The obtained t-value on 1st, 2nd and 3rd day is 3.5, 2.7, 3.0 respectively which is greater than the table value at 0.05% l.o.s and p-values are small (less than 0.05). So H0 is rejected and H1 is accepted. Thus it is concluded that supine position is significant in improving the SPO2 of neonates on days 1, 2 and 3.
- Paired t-test was used to compare the heart rates of neonates before and after supine position. The obtained t-value on 1st, 2nd and 3rd day is 3.3, 1.3, and 0.8 respectively. Day 1 obtained t-value is greater than the table value at 0.05% l.o.s. Day 2 and day 3 obtained t-value is less than table value 0.05% l.o.s. P-value corresponding to day 1 is small (less than 0.05). Supine position is significant in improving the heart rate of neonates on day 1. On day 2 and day 3 the supine position
showed improvement in heart rate, the improvement is not significant.

- Paired t-test was used to compare the respiratory rates of neonates before and after supine position. The obtained t-value on 1st, 2nd and 3rd day is -1.2, -0.5, 0.6 respectively which is small than the table value at 0.05% l.o.s. Since p-values are large (greater than 0.05), Supine position is not effective in improving the respiratory rate of neonates.

- Paired t-test was used to compare the SPO₂ of neonates before and after prone position. The obtained t-value on 1st, 2nd and 3rd day is 14.0, 19.4, 20.0 respectively which is greater than the table value at 0.05% l.o.s and p-values are small (less than 0.05). The null hypothesis is rejected and H₁₂ is accepted. Prone position is significant in improving the SPO₂ of neonates on days 1, 2 and 3.

- Paired t-test was used to compare the heart rates of neonates before and after prone position. The obtained t-value on 1st, 2nd and 3rd day is 1.2, 2.7, -0.7 respectively. In 2nd day t-value is greater than the table value at 0.05% l.o.s. 1st and 3rd day t-value is small than table value. P-value corresponding to day 2 is small (less than 0.05). Prone position is significant in improving the heart rate of neonates on day2. On day 2 prone positions showed improvement in heart rate, the improvement is not significant.

- Paired t-test was used to compare the respiratory rates of neonates before and after prone position. The obtained t-value on 1st, 2nd and 3rd day is -8.6, -5.0, and -8.0 respectively which greater than t value at 0.5 l.o.s and p-values are small (less than 0.05). Prone position is effective in reducing the respiratory rate of neonates.

- Two sample t-test was used to compare the effects of supine and prone position on SPO₂ of neonates. Since all the p-values are small (less than 0.05), H₀ is rejected and H₁ 4 is accepted. The effect of prone position was significantly higher in improving SPO₂ of neonates as compared to that of supine position on days 1, 2 and 3.

- Two sample t-test was used to compare the effect of supine and prone position on heart rates of neonates. P-value corresponding to day 1 is 0.051 (less than 0.05). The effect of prone position was significantly higher as compared to that of supine position on day 1. On days 2 and 3 the effects of prone and supine positions was not significant on heart rate.

- Two sample t-test was used to compare the effect of supine and prone position on respiratory rates of neonates. Since all the p-values are small (less than 0.05). The effect of prone position was significantly higher in reducing the respiratory rate of neonates as compared to that of supine position on days 1, 2 and 3.

- Two sample t-test was used to compare the effect of sequence of supine and prone position on SPO₂ of neonates. Since all p-values are large (greater than 0.05). The sequence of positions had no significant impact on SPO₂.

- Two sample t-test was used to compare the effect of sequence of supine and prone
position on heart rates of neonates. Since all p-values are large (greater than 0.05). The effect of sequence of supine and prone position on heart rates of neonates is not significant. If the prone position is given to the neonates followed by the supine position, the effect was higher as compared to the effect if the supine position given first followed by prone position on day 1. On day 2 supine position followed by the prone position showed higher effect on heart rate as compared to the prone position followed by supine position group.

- Two sample t-test was used to compare the effect of sequence of supine and prone position on respiratory rates of neonates. Since all p-values are large (greater than 0.05), there is no evidence for the effect of sequence of supine and prone position on Respiratory Rate. The sequence of positions had no significant impact on RR.

- P-values are large (greater than 0.05), none of the demographic variable was found to have significant association with effect of supine position on SPO₂.

- P-values corresponding to birth weight are small (less than 0.05), it is evident that birth weight has significant relationship with effect of prone position on SPO₂. Birth weight is the only demographic variable which was found to have significant association with effect of prone position on SPO₂.

- Since P-values corresponding to gestational age and APGAR score at 1 minute are small (less than 0.05), Gestational age and APGAR score at 1 minute are the demographic variables which were found to have significant association with effect of prone position on heart rate.

- Since P-values corresponding to APGAR score at 1 minute is small (less than 0.05), there is evidence to prove effect of prone position on Respiratory Rate (RR) with APGAR score at 1 minute. APGAR score at 1 minute is the only demographic variable which was found to have significant association with effect of prone position on respiratory rate.

- Since P-values are large (greater than 0.05), the effect on preterm and full term neonates is not significantly different. The mean values indicate that there is higher effect on SPO₂ of preterm neonates as compared to full term neonates.

**Conclusion**

The study reveals that both supine and prone position was effective in improving oxygen saturation in Neonates with specific respiratory disorders. But the effect of prone position was significantly higher in improving oxygen saturation of neonates as compared to that of supine position on days 1, 2 and 3. And the sequence of positions had no significant impact on oxygen saturation as per current study.

**References**