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THE EFFECT OF PRONE POSITION VERSUS SUPINE POSITION ON OXYGEN SATURATION AMONG JORDANIAN PRETERM WITH RESPIRATORY DISTRESS SYNDROME

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ABSTRACT

The prone position for preterm neonates had been playing an important role to improve physiological statues for respiratory distress syndrome diseases. Prone position correlates with improvement of diaphragmatic movement or pulmonary perfusion, especially in preterm neonates. Objective: To assess the oxygen saturation on Jordanian preterm neonates with respiratory distress syndrome, during prone position comparing to supine position. Method: This pilot study is conducted with randomized clinical trial of thirty preterm neonates (age < 28days of gestations) in nursery ward at Queen Rania hospital during two months from 25 July–25 September 2015. Supine - prone cycle was applied for one time, where preterm were placed first in supine position for total 2 hours, which then followed by prone position for 2 hours. Oxygen saturation was measured at 30 minutes intervals, corresponding to 8 samples for 4 hours. The data were recorded using the pulse oximeter by same staff nurse. Results: At the end of the last 2 hours of supine position, O2 saturation mean & SD was noted as (96.3 + 1.5) and at the end of last hour on prone position was (98.53 + 1.506). Independent sample t test revealed that there are significant differences between prone and supine position on this duration time, the result showed O2 saturation in prone position significant (t = 4.35, P < 0.05), (CI: 0.85–0.95). Conclusion: The prone position showed an effect on preterm babies diagnosed with respiratory distress syndrome diseases, comparing to the supine position. This maneuver considers safe method that decreases the complication in respiratory distress syndrome diseases on preterm neonates.

What The Researchers Know?

- *Effective prone position showed an enhancement not only on the respiratory status or peripheral O2 saturation and arterial blood gases, it also promotes heart rates and had showed greater sleep efficiency and fewer obstructive sleep apneas.*

- *Effect of prone positions duration on oxygen saturation is still controversial.*

What This Study Add?

- *Prone position for 2 hours duration had an effect on preterm neonates diagnosed with respiratory distress syndrome comparing that to supine position, even many studies showed the need of at least four hours to show this effect.*

- *Body positions of preterm neonate with mechanical ventilation are effective in any period of time as opposed to Studies that showed the early placement of preterm on prone position that had greater effect on O2 saturation.*

INTRODUCTION

Respiratory distress syndrome is still considered as the most contributor of neonatal mortality and morbidity, especially in preterm neonates, despite its management had developed over the past years (Sweet et al., 2016). In Jordan, it accounts for 53.3 of early, late and almost of neonatal death according to the national prospective study in Jordan (Batieha, Khader, Berdzuli, Chua-Oon's, et al., 2015)

Moreover, studies showed that 92 % of neonates born between 24–25 weeks of gestation, 88 % of neonates born between 26–27 weeks of gestation, 76 % of neonates born between 28–29 weeks of gestation and 57 % of neonates born between 30–31 weeks gestation present with this disease (EuroNeoNet, 2010).

Nursing position can affect physiological statues of respiratory system, especially in preterm neonates; the mechanism in putting neonates in prone position not only affect the chest mechanisms, but also it correlates to the improvement in tidal volume distribution and improve pulmonary perfusion which affects overall alveolar ventilation / perfusion mismatch (Kallet et al.,2015).

Effective prone position showed an enhancement not only on the respiratory status or peripheral O2 saturation and arterial blood gases, but also many studies showed affect on heart rates fluctuations in preterm infants (Ghorbani, Asadollahi, and Valizadeh, 2013 ; Babuyeh, Farhadi, Pasha, and Mojaveri, 2018).

In addition, prone position among preterm's had showed greater sleep efficiency and fewer obstructive sleep apnea as another benefit of this position (Bhat et al., 2006; Modesto et al., 2016).

The aim of this study is to show the effect of prone position on preterm baby comparing to supine position in order to improve oxygen saturation in Jordanian preterm neonates with respiratory distress syndrome, as up to the researcher knowledge, no studies published in Jordan has shown this significant effect of this nursing position.

METHODOLOGY

After legal and ethical approval of neonatal specialist health teams and agreement of institutional reviewed board of Royal medical services RMS in Jordan, this pilot study was conducted by selecting 30 preterm neonates for randomized clinical trial in neonatal ward at Queen Rania hospital of children.

The inclusion criteria was; preterm neonates who has lived less than 28 days of their gestational age, diagnosed with mild, moderate, or severe Respiratory Distress Syndrome RDS, they were on nasal CPAP, ventilation supports and on nasal canula according the hospital policy that apply oxygen support.

The researcher exclude following from the study; preterm neonates with major malformations or preterm's neonates with congenital heart diseases in order to minimize any risks.

The study had conducted approximately two months in duration from the 25 of July till 25 September/ 2015; the preterm's parents were informed about the study. One staff nurse was assigned in this study for oxygen saturation documentations. She was oriented about the criteria of this study prior to collecting the samples. The staff nurse had six years experience in nursery field, and she applied her experience during her routine care to the neonates in her duty shift, thus, the researcher ensured the credibility of oxygen recording sheets.

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The ways of monitoring was first started when baby was put into supine position, the O2 saturation was recorded during 30 minutes for exactly 2 hours in that position.

On second time, O2 was recorded by placing the same baby on prone position (abdomen on basinet and head lateral), and O2 saturation were recorded every 30 minutes till 2 hours. The data collection was done for all preterm neonates regardless of the kind of O2 therapy they had received, ventilation supports, nasal CPAP, or oxygen supports by nasal canula.

Pulse oximeter was used as data collection tool to assess oxygenation of preterm neonate. It is non-invasive technique that could show the hypoxic changes, and it had a sensitivity of 0.92 and specificity of 0.90 in recording oxygen saturation. (Lee, Mayberry, Crapo, and Jensen, 2000)

While changing the infants' position, the neonates with high body temperature were excluded, since the body temperature might affect oxygen saturation.

Furthermore, the data was first established by measuring the saturation for maximum 2hours. Whereas the nurse was monitoring and recording for each reading at least every 15 minutes to ensure the accuracy of this reading, and to see if there are any changes for the probe and the oximeter reading.

The infants' demographic data was obtained by the questioners (gestational age and gender, body weights, type of O2 supports) and also through supportive evidence from their files.

RESULTS

Statistical Package for the Social Sciences SPSS version 19 was used in this analysis. A total of 30 preterm's (mean of gestational age 31.13weeks, age range (26–35) weeks, and range of body weights (800–1900kg).

About 60 % of this neonates were male preterm and 40 % were female preterm neonate, the babies who conducted on nasal canula were 33 %, 27 % were on nasal CPAP, and 40 % were on ventilation support.

At the end of the last hour of supine position, O2 saturation mean with SD (96.3 + 1.5) and at the end of last hour, on prone position it was (98.5 + 1.5).

The results of independent sample t test revealed that there are significant differences between prone and supine where newborn in prone position showed more increase in O2 saturation ($t = 4.35$, $p < .05$), (CI: 0.85–0.95).

DISCUSSIONS

Placement of patients with Respiratory Distress Syndrome RDS in prone position (head lateral and abdomen on basinet) that followed supine position for two hours had shown an improvement in oxygen saturation despite that no global consensus revealed prone position in preterm's babies with RDS shorter or equal time of supine position had clinically improved oxygen saturation.

Also, Cochrane systematic reviewed studies showed that no evidence of exacting body positions of the neonate with mechanical ventilation are effective in producing clinically oxygen saturation improvements (Fernandez, Figuls, Izquierdo, Escribano, Balaguer, 2016).

In this study, placement of preterm's neonates with respiratory distress syndrome RDS in prone position that followed supine position for two hours had shown an improvement in oxygen saturation, this was similar of Lestari,

Susmarini, and Awaludin et al. (2018) study that showed quarter turn from prone position median was 94 %, and after two hours of intervention was 96.5 % among twenty premature babies with RDS receiving nasal CPAP with 25–40 % fiO2.

However, there was not much evidence to show that the exact duration that improve oxygen saturation in comparing that to adult (Bloomfield, Noble, and Sudlow, 2015).

The study of Shanker et al. (2013) which showed that the prone position improves oxygenation as compared to supine position in one hundred ventilated neonates with respiratory distress, who were reserved in supine position for three hours after all necessary resuscitative measures. After that they were kept in prone position for six hours. The result of PaO2 of all neonates increased by about 7 % and the supine position, it was 86.4+5.7 and in prone 93.5+4.1 with p value of < 0.001 which is statistically significant.

While a study of Das et al. (2011) showed prone position improves oxygen saturation and decreases respiratory distress as compared to supine position in one hundred neonates with oxygen hood; mean and SD 84.84 + 4 in supine position and within 2 hour in prone position saturation was 91.05 + 3.29, after 4 hour it was 91.62 + 3.89 and after 6 hours it was 92.63 + 3.02 respectively with P value of < 0.001 which is statistically highly significant

CONCLUSIONS

Since the effect of prone positions on oxygen saturation are controversial, this pilot study showed that the prone position for 2 hours duration had an effect on Jordanian preterm neonates diagnosed with respiratory distress syndrome, regardless of their state of oxygen support or not, comparing that to supine position.

The researcher needs larger samples to generalize this conclusion, and to be more specific in describing the appropriate position, and clarifying the settings of this maneuver.

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