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A modified gentle human touch (GHT) to increase oxygen saturation levels on low birth weight infants: A study at a Private and Public Hospital in Central Java, Indonesia

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ABSTRACT

Background: Low birth weight (LBW) care in hospitals often causes discomfort and stress which affect changes in physiological function. Modification of gentle human touch with the left lateral position is described as a treatment for developmental care that supports the comfort and supportive position of the lungs which is expected to have a positive effect on oxygen saturation and respiratory frequency for infants.
Aims: This study aimed to find the effect of gentle human touch modification with a left lateral position on oxygen saturation in LBW infants.
Methods: This study used a quasi-experimental design study. The population in this study was 36 LBW babies who received care, selected at a private and public hospital in Central Java, Indonesia, using a consecutive sampling technique. The infants were then divided equally to: (i) a group who received a standard human touch given at the hospital, with a supine position (control), and (ii) a group where the infants have been provided with a modified gentle human touch with left lateral position (intervention). The statistical test used was Mann Whitney and Wilcoxon test.
Results: From this study, it is acknowledged that modification gentle human touch with the left lateral position was more effective in increasing oxygen saturation than the control group when viewed from clinical changes. The oxygen saturation levels after intervention reached 98 to 99%. However, from the statistical analysis, it has been noted that the mean difference between the two groups is not significantly different at a level of 0.05.
Conclusions: A modified gentle human touch with the left lateral position proposed in this study presents a positive contribution to the oxygen saturation of low birth weight infants. Thus, the findings may recommend the modification as a procedure in a hospital care unit for low birth weight infants at hospitals or at home.

INTRODUCTION

Low Birth Weight (LBW) is one of the complications in infants which contributes to infant mortality. Deaths and disabilities in low birth weight and premature infants are caused by the failure of adaptation. After birth, a baby must be able to adapt to survive [1]. Medical treatments and technology utilizations are used to improve the survival rate of premature infants and low birth weight babies. Nevertheless, those procedures might bring discomfort to the babies and cause changes in their physiological function such as hypothermia, tachycardia, recurrent apnea and low SpO2 which lead to the need of oxygen supplementation [2]. The alternative to ease the discomforts aforementioned is through touching, the first sense that was developed at the age of 7 weeks of pregnancy and is the foundation for the development of verbal communication, learning, regulation and social interaction. Gentle human touch (GHT) is a

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complementary therapy in the form of non-invasive touch without caressing or massaging that is easily combined with other therapies. GHT therapy with the left lateral position is described as a treatment to support the comfort that is expected to have a positive effect on infants' oxygen saturation and respiratory rate [3].

METHODS

This study used a quasi-experimental design where the procedures have been approved by Health Research Ethics Commission of Politeknik Kesehatan Kemenkes Semarang (No.401/KEPK/Poltekkes-Smg/EC/2018) on 21 June 2018. The population in this study were all LBW infants who were treated in Bhakti Asih Hospital and Brebes General District Hospital, a private and a public hospital in Brebes District, Central Java, Indonesia. Those two hospitals were selected as study sites since we found high LBW babies case. There were 36 LBW babies selected using a consecutive sampling technique by doing inclusion and exclusion until all the patients were recruited, started from 14 July 2019 to 2 August 2019. With inclusion criteria: babies weighing 1500-2500 grams, infants with gestational age ≥ 27 weeks and ≤ 41 weeks, Infants with unstable clinical conditions such as respiratory aids, required ventilator to breath or phototherapy, and had a history of heart disease, sepsis, and cyanosis were excluded from the study.

The low birth weight babies at the intervention group in this study were given a gentle human touch modification with the left lateral position, while at the control group the infants received a gentle human touch with a supine position. The treatment in both groups has been provided twice a day, in the morning and in the evening with 30 minutes duration in each time in five consecutive days. The treatment was addressed by certified midwives or nurses which had been trained prior to the treatment. Modification gentle human touch with left lateral position was as follows:

1. Washed both hands and arms with antimicrobial agents
2. The enumerator performs hand containment by placing both hands on both sides of the head, then place the left hand on the top of the head and right on the sole of the foot
3. Position the baby with the left lateral position. use a cloth so that the baby is like hugging a pillow.
4. The enumerator placed the fingertips of one hand above the eyebrow line with the palm touching the LBW's crown while the other hand was rested on the lower abdomen of the infant encompassing the waist and the hip.
5. Gentle human touch is done twice in the morning and afternoon for 5 days.

An observation sheet was used to record the data collected from the study. Measurement of saturation values was done by an oximetry device. The data were analyzed using SPSS software. To determine the significant changes (mean difference) in oxygen saturation in each group, Mann Whitney test was used, while to test which groups has more influential, Wilcoxon test was employed

RESULTS

Characteristics of respondents

The characteristics of respondents in this study were distributed based on birth status and gender. The result of the distribution of respondents' characteristic is displayed on Table 1. Most of the respondents (75%) were in preterm birth status with the percentage in intervention and control group were 83% and 66.7%, respectively. In gender distribution, there were more male in control group (72.2%) than in intervention group (44.4%). The result of body weight measurement shows that the mean of body weight in intervention and control group were 1894 grams ±268.6 and 2030 grams ±3390, respectively. Even at the control group the baby weight (Mean ± Standard deviation) is slightly higher, however, the difference is not significant (*p* value = 0.163).

Table 1. Characteristics of LBW infants in Brebes General District Hospital and Bhakti Asih Hospital (N=36)

Variables	Intervention	Control	Total
Birth Status, n (%)			
Preterm	15 (83.3)	12 (66.7)	27 (75.0)
Aterm	3 (16.7)	6 (33.3)	9 (25.0)
Sex, n (%)			
Male	8 (44.4)	13 (72.2)	21 (58.3)
Female	10 (55.6)	5 (27.8)	15 (41.7)
Weight (gram)*	1894 ± 268.6	2030 ± 339.0	

Gentle human touch increases oxygen saturation in low birth weight infants

From Table 2, we noticed that the values of oxygen saturation (Mean ± SD) at the two groups are increasing over the time. The results shows that the oxygen saturation given at the intervention group where a gentle human touch (GHT) at the left lateral position present a significant increase at the Day 1 from 96 ± 2.37 to 98 ± 2.31 while at the control group where the standard GHT given at a supine position the significant raise was observed at the Day 2 from 97 ± 2.07 to 98 ± 1.79. Either

at control or intervention group, the highest oxygen saturation was noticed at the Day 5.

Table 2. Mean and standard deviation of oxygen saturation before and after treatment at the control and intervention group (N=36)

Observation Day	Oxygen Saturation (%)	
	Intervention	Control
Day 1[a]		
Pre Test 1	96 ± 2.37	97 ± 2.50
Post Test 1	98 ± 2.31	97 ± 2.59
Day 2[a,b]		
Pre Test 2	97 ± 2.19	97 ± 2.07
Post Test 2	98 ± 1.62	98 ± 1.79
Day 3[a,b]		
Pre Test 3	97 ± 1.97	96 ± 2.39
Post Test 3	99 ± 1.58	98 ± 2.01
Day 4[a]		
Pre Test 4	97 ± 1.70	97 ± 2.91
Post Test 4	99 ± 1.72	97 ± 2.74
Day 5[a,b]		
Pre Test 5	98 ± 1.69	97 ± 1.99
Post Test 5	99 ± 1.08	98 ± 1.97

Significantly different between the Pre and Posttest (p value < 0.05) in the (a) intervention group, and (b) control group.

The oxygen saturation by a modified gentle human touch with the left lateral position is slightly higher than the results by the standard touch at the supine position

Table 3 presents how the different position of touch affects the oxygen saturation among the low birth weight infants. A modified gentle human touch provided to the babies at the intervention group increase the oxygen saturation higher than those in the control group at the observation day 1 until the five days after touching was given. The highest difference (Δ) between the two groups was observed at Day 1, following with the Day 4. However, even the delta reached 1.58, the mean difference of oxygen saturation between the control and intervention group is not significant (*p* value = 0.851).

All the *p* values indicate that none of the days had the difference mean of oxygen saturation level between intervention group and control group (p>0.05). Nevertheless, the data in delta column shows all the positive value which means that the improvements in intervention group were higher than control group. The values in delta column were obtained by subtracted intervention group to control group.

Table 3. Delta (Δ) oxygen saturation levels by group

Observation Day	Oxygen saturation (%)		*p* value*
	Mean ± SD	Δ	
Day 1			
Intervention	1.72 ± 1.629	1.58	0.851
Control	0.14 ± 1.542		
Day 2			
Intervention	1.31 ± 2.289	0.7	0.857
Control	0.61 ± 1.119		
Day 3			
Intervention	1.56 ± 1.806	0.14	0.642
Control	1.42 ± 1.061		
Day 4			
Intervention	1.56 ± 1.806	1.25	0.581
Control	0.31 ± 1.416		
Day 5			
Intervention	1.56 ± 1.773	0.73	0.607
Control	0.83 ± 1.465		

DISCUSSION

Oxygen saturation is a percentage of hemoglobin that binds in the arteries [4]. Oxygen saturation is also an illustration of the flow of oxygen in the body which plays an essential role in optimizing the function of heart and other body organs because oxygen is one of the metabolic fuels [5]. The level of oxygen saturation in newborns is fundamental to know because if the levels of oxygen saturation in newborns are of low value it is worth watching for hemodynamic abnormalities in infants [6]. The factors that influence oxygen saturation including the amount of oxygen entering the lungs (ventilation), diffusion speed and hemoglobin capacity in carrying oxygen [7]. In addition to those factors, some studies also suggested that the position of the baby and stress due to the environment of baby care can also affect oxygen saturation levels in infants [8, 5].

The data in Table 2 shows that the oxygen saturation level at the Pretest (before GHT given) at the control and intervention group was more than 90%. It indicates that no infants experienced hypoxemia during the participation [9]. This study acknowledges that a gentle human touch given to the low birth weight infants either with a supine position (control group) or with left lateral position (intervention group) orchestrates the increment of oxygen saturation level. This finding confirms that both treatment bring improvement to the LBW babies (patients). Leading the oxygen saturation to be higher than 92% may deplete the probability of the LBW infants for having pneumonia [10].

Research conducted for 6 months in France in premature infants suggested that the left lateral position was effective in improving lung function and could be an

alternative to the position of prone in infants with respiratory system disorders. The left lateral position is the same as the prone position can improve lung function by optimizing the amount of oxygen entering the lungs (ventilation). In this study, infants who were given a left lateral position had an average oxygen saturation level of 95% after the act of positioning the left lateral baby. Thoracoabdominal synchronization plays an important role in the efficiency of lung ventilation. The left lateral position of the baby is associated with a more efficient respiratory pattern through chest wall stabilization and increased Thoracoabdominal synchronization. Thoracoabdominal synchronization makes the babies' ventilation become optimal, causing the amount of oxygen entering the lungs to be increased [11]. Moreover, the Gentle human touch itself leads the very preterm hospitalized infant to be relaxed [12].

The results of this present study show that the modified GHT at the intervention contributed a greater improvement than the standard GHT at the control group, though it was not statistically tested. The result of the comparisson between intervention group and control group as shown on Table 3 indicates that there was no significant difference recorded over the time since the first day after treatment to the last Day 5. Nevertheless, the value of changes in delta coloumn shows that the modified gentle human touch with the left lateral position in intervention group still performed better than the gentle human touch with a supine position in control group.

CONCLUSION

This study presents the benefits of gentle human touch (GHT) in low birth weight babies in increasing the oxygen saturation. The findings found that even not significantly different, a modified gentle human touch with the left lateral position given for 30 minutes 2 times a day within 5 days was more influential on increasing oxygen saturation in LBW infants compared to the standard gentle human touch with supine position. The oxygen saturation of LBW infants has increased by 1% to 2% and is stable at 98-99%. The findings suggest that the modified gentle human touch can be included as an alternative for low birth weight infants to increase the oxygen saturation in the neonatal intensive care unit.

CONFLICT OF INTERESTS

No conflict of interests in this study.

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