

The Effect of Developmental Care on Physiological Function of Low Birth Weight Baby Using Pre-Post Design

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Abstract. Low birth weight babies often experience some problems in the period soon after birth as a result of the characteristics of an immature organ so can causes the inability to regulate the stimulus that comes resulting in the baby tends to stress. Developmental Care is an orphanage that facilitates the development of infants through the management of the care and observation of infant behavior so that babies receive an adequate stimulus causing increased physiological stabilization and decreased stress. This study aims to determine the influence of Developmental Care of physiological function (oxygen saturation and pulse) of Low birth weight babies. The design used in this study was pre-experimental with a type of one-group pre-post test design. The samples in this study were Low birth weight babies that were treated in the perinatology room of Dr. Soekardjo in Tasikmalaya City which amounted to 18 with sampling techniques Purposive Sampling. Analysis of the data used is a univariate analytic to find the average pulse rate and oxygen saturation both before and after the Developmental Care, while for bivariate analysis using Wilcoxon test. The results of the analysis showed significant influence of developmental care of oxygen saturation with (p value 0.000), but not significant to the pulse (p value 0.948). Based on the results of the research is recommended to the hospital to increase other interventions that support developmental care in order to improve the quality of nursing care, especially at Low birth weight babies.

Keywords—*Care, Physiological Function, Low Birth, Weight Baby, Pre-Post Design*

I. INTRODUCTION

Low birth weight babies are having difficulty to adapt and strong defense with extra uterine. The cause is the immaturity of organs system of the babies, such as lungs, kidney, imunity, and digests system (Deswita, 2010) [14]. Difficulty of low birth weight babies to adapt with their environment and susceptible to stress are the main factor of pain and death risk (Syahreni, 2010) [11] Developmental Care is a model to modificate neonatus environment and learn how to respond behavior change to needs.

Developmental Care based on theory the depelovment of baby brains since newly born until 3 years old.

Development of brain will be disrupted when premature babies have to born (Horner, 2010). The government still concerns to low birth weight babies to decrease the numbers of death in Indonesia. Based on Basic Health Research in 2018, there are around 6,2% of low birth weight babies. Low birth weight babies need a right and an intensive care. It designs to support babies's survival. The fact is intensive care becoming source of babies's stress as an excessive stimulation, such as alarm incubator' noises, ventilator, patient monitor, invasive procedure, parental separation (Symington & Pinelli, 2006; Lissauer & Fanaroff, 2009)[3] [4].

Strategy on the treatment can be done to optimize physiological functions, develop and high risk growth of the babies with developmental or growth care. Developmental care facilitated the growth of babies through management of environment care and their behavior. So they have strong stimulated and increasing physiological stability and reduce stress. (Horner, 2010)[1]. There are few hospitals that already implemented Developmental care including RSUD dr Soekardjo Kota Tasikmalaya which well socialized. There are many nurses who not realized yet that it's important to increase babies care especially low birth weight babies. Meanwhile, nursing care still focus on handling physical problem. Whereas growth and development aspect still not being main concerns to reduce stress due the hospitalization.

II. MATERIALS AND METHODS

Pre-experimental with one-group pre- post-test design are used on this research. Low birth weight baby that have been treated in Perinatologi's room with sample 18 is using Purposive Sampling. Research observed respondent before developmental care by filling observation's sheets which are about psycholological function includes saturation of oxygen and pulse. Pulse measurement and oxygen saturation done before intervention and after intervention in 30 minutes. Intervention given as implementation of the developmental care is minimal handling to minimalized physical, nesting

given and right lateral position.

III. RESULTS

TABLE 1. RESPONDENT DISTRIBUTION BASED ON AGE DURING RESEARCH, WEIGHT BORN, WEIGHT DURING RESEARCH

| Variable | Mean | SD | Min-Max | 95% CI |
|------------------------|---------|---------|-----------|-----------------|
| Age During Research | 8.00 | 8.645 | 1-28 | 5.20-13.80 |
| Weight Born | 1727.78 | 364.297 | 1000-2300 | 1546.62-1908.94 |
| Weight during research | 1822.78 | 329.564 | 1400-2435 | 1658.89-1986.67 |

Resource: primary data, 2019

Table 1 showed the mean of respondent distribution low birth weight babies based on age during research as old as 8 days with standard intersection 8.645 days. The youngest one is 1 day and the oldest one is 28 days. The result of interval estimation can be concluded that 95 % believed the average age of low birth during research is around 5.20 days to 13.80 days.

The average of respondent distribution low birth weight babies based weigh born as many as 1727.78 grams with standard intersection 364.297 grams. The lightest one is 1000 grams and the heaviest one is 2300 grams. The result of interval estimation can be concluded that 95 % believed the average weight of low birth weight babies is around 1546.62 grams to 1908.94 grams.

The average of respondent distribution low birth weight babies base weight born during research as many as 1822.78 grams with standart intersection 329.564 grams. The lightest one is 1400 grams and the haviest one is 2435 grams. The result of interval estimation can be concluded that 95 % believed the avarage weight of low birth weight babies during research is around 1658.89 grams to 1986.67 gram

TABLE 2. RESPONDENT DISTRIBUTION BASED ON OXYGEN SATURATION AND PULSE

| Variable | Fase | n | Mean | SD | Min-Max | 95% CI |
|-------------------|----------------------------|----|--------|--------|---------|---------------|
| Oxygen Saturation | Without developmental care | 18 | 92.50 | 5.651 | 70-95 | 88.13-93.75 |
| | With developmental care | 18 | 95.11 | 1.367 | 93-98 | 94.43-95.79 |
| Pulze | Without developmental care | 18 | 142.50 | 15.928 | 99-163 | 133.30-149.14 |
| | With developmental care | 18 | 140.67 | 15.201 | 112-164 | 133.11-148-23 |

Resource: primary data, 2019

Table 2. Showed the average of respondent distribution based on oxygen saturation without developmental care as much as 92.50% with standard intersection 5.651%. Meanwhile, average oxygen saturation on the face with

development care as much as 95.11% with standard intersection 1.367. The lowest oxygen saturation during development care is 93 and the highest is 98. The result of interval estimation can be concluded that 95 % believed oxygen saturation without developmental care is around 88.13% to 93.75%. Meanwhile with developmental care is around 94.43% to 95.79%.

The average of respondent distribution based on pulse without development care as many as 142.50 x/minutes with standard intersection 15.928 x/minutes. Meanwhile, average pulse on the face with development care as much as 140.67 x/minutes with standard intersection 15.201 x/minutes. The lowest pulse without development care is 99 x/minutes and the highest is 163 x/minutes. Meanwhile the lowest pulse with development care is 112 x/minutes and the highest is 164 x/minutes. The result of interval estimation can be concluded that 95 % believed pulse without developmental care is around 133.36 x/minutes to 149.14 x/minutes. Meanwhile with developmental care is around 133.11 x/minutes to 148.23 x/minutes.

TABLE 3. DIVERSITY OF AVARAGE PHYCIOLOGICAL FUNCTION (OXYGEN SATURATION AND PULSE)

| Variable | Fase | n | Mean | SD | Average difference | p |
|-------------------|----------------------------|----|--------|--------|--------------------|-------|
| Oxygen Saturation | Without developmental care | 18 | 92.50 | 5.651 | 4.17 | 0.000 |
| | With developmental care | 18 | 95.11 | 1.367 | | |
| Pulze | Without developmental care | 18 | 142.50 | 15.928 | -1.83 | 0.948 |
| | With developmental care | 18 | 140.67 | 15.201 | | |

Resource: primary data, 2019

Table 3. Showed the diversity of average oxygen saturation between phase measurements without and with developmental care as much as 4.17%. Based on statistical analysis with no parametric test, there is a significant impact of developmental care to oxygen saturation with p value =0.000. The table above also showed the diversity of pulse between phase measurements with and without developmental care as many as -1.83 x/minutes. Based on statistical analysis there is no significant impact of developmental care to pulse with p value= 0.948.

IV. DISCUSSION

Low birth weight babies are usually suffering many problems on soon after birth stage as charasteristich of immature organs. The problem that emerges can cause babies stress. Low birth weight babies suffering stress during treatment with environment condition and treatment activity that can be showed by the baby, including physioslogis change, alertness or care, and motorical activity (Hockenberry

&Wilson,2007) [8]

Respon of stress moved by an area on the part of brain called amiglada. This respon of stress stimulates the discharge of adrenoortikoid hormone to hipotalamus that can cause the discharge of cortisol increase. It stimulates activity of sympathetic nervous systems. Increases rate, glicolisis and gluconeogenesis of heart. Reduces glucosake transports in storage system. Increases protein catabolism, so that occurs discharges amino acid from all over system but heart, and presses imunity activity to produce anti imflamation effect (Ward, Clark, & Linden, 2009).[15]

Stress can also causing exsessive ananergi user to low birth weight babies. This condition can cause resistance in energy conservation that needed by them to grow and develop. (Wong et al, 2009)[8]. Nurses have an important role to create treatment environment without stress. This environment can create by using developmental care. In this research developmental care aspect that had been given is nesting, minimal handling, right lateral potiton. The result of this research showed that there is diversity of oxygen saturation low birth weight babies on the phase with or without developmental care. It means there is an impact of to it.

Research result showed there is increasing of oxygen saturation to low birth weight babies after 30 minutes of developmental care intervension. The avarage of saturation oxygen increases from 92.50% to 95.11% after developmental care. Although there is enchanment, but oxygen saturation of new born babies must be at least 90– 92 %. From statistical trial test by using wilcoxon test obtained p value = 0,000, this can be show that there is an impact of developmental care to oxygen saturation. It goes with Saprudin and Kumalasari' research in 2018 that showed there is an impact of nesting to body temperature, oxygen saturaton and pulse to low birth weight babies with p value < 0.05. Oxygen saturation is presentasing hemoglobin amount which oxydised on blood (Brooker, 2005; Hockenberry & Wilson, 2007) [7] [8].

The important role of hemoglobin is to bond oxygen in every molecules. Hemoglobin is a protein form that has four sub-units polipeptida globin and porfirin chains. They contain heme. Heme itself contains one atomic iron in form of ferro, so one hemoglobin molecul has four atomic irons which bond four molecules of oxygen (Aaronson & Ward, 2010) [16]. The increasing of oxygen saturation in this case happens because the age of the baby that relatively under one month. It connecting to residual of hemoglobin accumulation phase until nutrition intake gotten by respondent. Besides that, comfort factor also impacts to the baby so it can decrease body metabolism which in the end it can increase oxygen saturation (Saprudin, Kumala sari, 2018) [13].

This research is also supported by Zen (2017) [12] explained that there is an impact of nesting to increase oxygen saturation to premature baby with p value= 0,000. Rahmawaty, Prawesti & Fatimah (2017) [1], research explains that there is worth impact of nesting to oxygen saturation with

p value= 0,000. A similar result research of Bayuningsih (2011) [10], explains there is a worth diversity of oxygen saturation before and after nesting to premature baby with p value = 0,001. Beside oxygen saturation, physiologic function also observed in this research is pulse. Analistyc statistic result shows that there is reducing avarage of pulse from phase without developmental care decreasing to 140.67 after developmental care. Statistical test result also showed that there is no impact of developmental care to the pulse with p value = 0,948.

It goes with Zen (2017) [12] and Bayuningsih (2011) [10], reseacrh explained that there is on impact of nesting to low birth weight babies with each pvalue=0,601 and 0,087. Although there is decreasing of pulse in this research, but the avarage of baby' pulse is still normal. According researchers assumption decreasing of pulse caused by developmental care intervention such as nesting, minimal handling, and fleksi right lateral position. In this phase the babies deep sleep more. In deep sleeping not only pulse that have been decreases but tonus vascular perifer and arterical blood preasure, dilatation of the veins to skin also.

V. CONCLUSION AND SUGGESTION

A. Conclusion

- Characteristics of the low birth weight babies in this research is in avarage ages during research are 8 days, avarage weights 1727.78 grams, avarage weights during research are 1822.78 grams.
- Avarage of oxygen saturation of the low birth weight babies without developmental care is 92.50%, meanwhile with developmental care is 95.11%
- Babies without developmental care is 142.50 x/minutes. Meanwhile the avarage of pulse with developmental care is 140.67 x/minutes
- There is an impact of developmental care to low birth weight babies' oxygen saturation with p value = 0.000 and there is no impact of developmental care to their pulse with p value = 0.948

1.1 Suggestion

- RSUD dr Soekardjo Kota Tasikmalaya especially Perinatologi Room suggested to make Standart Operation Procedure about intervention to increase developmental care for low birth weight babies.
- Nurses should be giving developmental care training to improve their knowledge and skill to handling low birth weight as well as premature babies.

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REFERENCES

- [1] Horner,S. 2010. *Developmental care. Article of Neonatal Intensive Care, Chicago Children's Memorial Hospital*. <http://www.developmental.aspx.html>
- [2] Riset kesehatan dasar .2018. Jakarta: Kementerian Kesehatan RI.
- [3] Symington, A.J., &Pinelli, J. 2006. Developmental care for Promoting development and preventing morbidity inpreterm infants.Cochrane Data base of Systemic Review,2. Diunduh dari www.cochrane.org
- [4] Lissauer, T& Fanaroff, A.(2009).At a glance: neonatologi.Jakarta:Erlangga
- [5] Coughlin,M, Gibbins,S, & Hoath, S. 2009.Core measures for developmentally supportive care in neonatal intensive care units: theory,precedence and practice. *Journal of Advanced Nursing*, 65(10), 2239–48. doi:10.1111/j.1365-2648.2009.05052.x
- [6] Bobak, I.M, Lowdermilk, D.L &Jensen, M.D.2005. Buku Ajar Keperawatan Maternitas. (edisi4). Jakarta: EGC
- [7] Brooker,C .2005. Ensiklopedi Keperawatan. Jakarta: EGC
- [8] Hockenberry, M.J, &Wilson,D. 2009. Wong's essentials of pediatric nursing (8th Ed.). St.Louis:Elsevier.
- [9] Sugiyono. 2009. Statistik untuk penelitian. Bandung: Alfabetas
- [10] Bayuningsih, R. 2011. Efektifitas penggunaan nesting dan posisi prone pada bayi premature terhadap saturasi oksigen dan frekuensi nadi di Rumah Sakit Umum Daerah Kota Bekasi. Tesis. Tidak Dipublikasikan. Depok: UniversitasIndonesia.
- [11] Syahreni,E. 2010.Tesis:Pengaturan pengaruhstimulus sensoris terhadap respon fisiologisdan perilaku BBLR di RSUPN Dr.Ciptomangunkusumo. Tidak dipublikasikan. Depok:Universitas Indonesia
- [12] Zen, N D. 2017. Pengaruh nesting terhadap perubahan fisiologis dan perilaku bayi premature di perinatology Rumah Sakit Umum Daerah Tasikmalaya. *Jurnal Kesehatan Bakti Tunas Husada*. Volume 17(2).
- [13] Saprudin, Kumalasari. 2018. Pengaruh penggunaan nesting terhadap perubahan suhu tubuh, saturasi oksigen dan frekuensi nadi pada bayi berat badan lahir rendah di Kota Cirebon, di unduh di <http://doi.org/1034305/jikbh.vgi2.63>
- [14] Deswita. 2010. Pengaruh perawatan metode kangruru terhadap respon fisiologis bayi premature dan kepercayaan diri ibu dalam merawat bayi di dua rumah sakit di Jakarta, diunduh pada tanggal 16 Juli 2019 dari www.lib.ui.ac.id.
- [15] Ward, J.P.T, Clark, R, & Linden R. 2009. At a glance: Fisiologi. Jakarta: Erlangga
- [16] Aaronson, P.I. & Ward,J.P.T. 2010. At a glance: Sistem Kardivaskular (edisi3). Jakarta : Erlangga
- [17] Rahmawaty, S; Prawesty, A;Fatimah, S. 2017. Pengaruh nesting terhadap saturasi oksigen dan berat badan pada bayi premature di Ruang Perinatologi RSUP dr.Hasan Sadikin Bandung. *Jurnal Keperawatan Aisiyah*, 4 (2): 1-8.