

The Effect of Murottal Alquran Therapy on Heart Rate, Respiration Rate, Saturation Oxygen of Premature Infants Using Mechanical Ventilation in the Neonatal Intensive Care Unit

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Abstract - Prematurities or low birth weight commonly contributes to the mortality rate of newborns. About 35% of babies born prematurely are very vulnerable for inability to adapt to the extrauterine environment. This condition often requires intensive monitoring such as the Neonatal Intensive Care Unit (NICU) for infant safety. Premature babies who undergo treatment at the NICU generally use breathing aids to support the needs of their physiological conditions. Premature babies who are attached to breathing aids must be in a calm condition so that there is synchronization between the baby's breath with the breathing aids manifested by changes in heart rate, respiration rate, and oxygen saturation. Various therapies are used to provide calming effects such as music therapy. Indonesian people are familiar with reading holy alquran (murottal therapy) as therapy for the sick. This study aims to find out the effect of murottal alquran therapy on changes in baby's physiological parameters: heart rate, respiration rate and oxygen saturation in premature infants with mechanical ventilation. This study used a quasi-experimental pre-post test design for 20 randomly selected infants through a simple random sampling approach, with criteria for infant attachment to mechanical ventilation mode (CPAP), 24-34 weeks' gestation, not experiencing ischemic hypoxic encephalopathy. Data collection was taken by measuring heart rate,

respiration rate, and oxygen saturation before and after murottal alquran therapy was given for 3 days. Data were analyzed univariately for each variable looking at the frequency distribution, percentage, and average value, as well as the standard deviation of each variable. To see the difference and the effect of murottal therapy intervention using Wilcoxon, Mann Whitney, and Friedman test with a significance level of 95% ($p < 0.05$). The results showed that most babies were male (55%), the average gestational age was 31-32 weeks, birth weight was 2675, the birth process was sectio caesaria using CPAP mode mechanical ventilation with average PEEP 8, oxygen flow 7.75, FiO₂ 36.75%. There was a difference in mean values, where before therapy the respiration rate was 47.2 and the heart rate was 126.5 SPO₂ 95.4 and after 3 days of murottal therapy the respiratory rate was 41.7 and the heart rate was 133 SPO₂ 97.6. Friedman test results showed the influence of murottal therapy on respiration rate ($p = 0.031$) and heart rate ($p = 0.05$) SPO₂ (0.01) $P < 0.05$. Murottal Alquran therapy is effective in using premature infants with mechanical ventilation against the hemodynamic stability of the baby during treatment in the NICU.

Keywords: infants, premature, murottal alquran, heart rate, respiration-rate, oxygen saturation

INTRODUCTION

Premature infant or also known as preterm babies are babies born with not enough months of birth (less than 37 weeks) which is still a big problem in Indonesia. In 2010, Indonesia ranked fifth in the world with the most cases of preterm birth in the world. (WHO, 2016). This can be seen based on Indonesia's population of around 255 million people, with the percentage of premature births reaching 675,700 cases per year from around 4.5 million births per year. Babies with premature birth face many health problems, this is related to organ immaturity. This condition is the main factor causing premature babies to be the biggest contributor to infant mortality and has the possibility of physical disability. In addition, even babies who survived still have the possibility of experiencing cognitive, vision, and hearing disorders. Premature baby care can be categorized as very complicated and complex because of the large risks that can occur early in life.

Premature babies also have a high risk for developmental disorders ranging from mild to severe levels that have the impact of disability. So the science and technology developed today is not only to make premature babies survive and adapt to their environment but also to catch up with

development due to premature birth. Premature babies often experience problems related to complications due to premature conditions associated with prematurity anemia, respiratory distress syndrome, premature retinopathy, patent ductus arteriosus, and premature apnea. While the long-term complications are bronchopulmonary dysplasia, speech defects and neurological defects (Butler, 2007; Gorrie, McKinney & Murray, 2005, Pilliteri, 2003).

The results of research conducted by Chirian et al (2012) in Japan showed that the most problem in preterm infants being treated in the Neonatal Intensive Care Unit (NICU) was respiratory distress syndrome around 68%. This is because surfactants are not yet fully formed which functions as a lubricant for lung development by reducing pulmonary stress and immaturity of the neurological system that regulates breathing (Bathia, 2000). The incidence of respiratory distress syndrome will increase if the baby is born with a smaller gestational age, from EuroNeoStat (2006) premature babies will potentially experience respiratory distress syndrome that is 91% at 23-35 weeks gestation, 88% at 26-27 weeks gestation, 74% at 28-29 weeks gestation, and 52% at 30-31 weeks gestation. Manifestations

arising from respiratory distress syndrome include increased breath frequency, decreased saturation, increased breathing effort, cyanosis, and decreased lung sounds. To overcome the respiratory distress syndrome, preterm infants are given surfactants from outside to reduce the tension of the alveoli and not to make the alveoli collapse. So this facilitates the process of inspiration and expiration. Provision of surfactants is usually followed by the installation of mechanical ventilation or continuous positive airway pressure (CPAP) machines to keep the alveoli inflated (David et al, 2010). The purpose of handling the problem of respiratory distress syndrome in premature infants is to avoid atelectrauma by maintaining alveoli stability, limiting volume to prevent excessive distention of the alveolar and prevent oxygen toxicity (Berger, et al., 2013).

While using breathing aids such as mechanical ventilation or CPAP machines, premature babies are treated at the NICU. The NICU environment is different from the womb environment that premature babies should be. However treatments are designed to sustain life and help the growth and development of premature babies, the NICU environment is an environment that can

cause stress for premature babies. Stress conditions can cause physical responses for premature babies such as increased heart rate, decreased saturation, increased intracranial pressure (Hastuti, 2016; Field, et al, 2009), and changes in facial responses. It also can increase cortisol in plasma (Gunnar, 2005), sleep disorders and decrease the immune system which is known to be very low in premature babies (Anand, 2008). In addition, changes in respiration rate can cause baby's breathing and breathing from non-synchronous mechanical ventilation devices known as fighting which results in excessive alveolar distension and ultimately atelectrauma. Besides the increased heart work resulting in increased oxygen demand, the baby will experience desaturation. To overcome this desaturase, the oxygen fraction is increased which can affect oxygen toxicity.

Efforts made to reduce stress in premature babies at the NICU are grouping actions, adjusting the position of the baby by using nesting, baby massage, kangaroo method (Wahyuni, 2013). Giving oral sucrose and instrumental therapy such as murotta alquran therapy, so that premature babies do not experience stress and can support their growth and development. Based on the description in the background above,

the researchers are interested in conducting research "The effect of murottal quran therapy on heart rate, respiration rate, oxygen saturation in premature infants using mechanical ventilation aids in the NICU room of Raden Mattaher Hospital"

METHODS

This study used a quasi-experimental design with one group pre-post test of 20 infants selected randomly through a simple random sampling approach, with criteria for infant attachment to breathing devices (CPAP) 24-34 weeks' gestation, not experiencing ischemic hypoxic encephalopathy. Data collection was performed to measure heart rate, respiration rate, and oxygen saturation before murottal therapy was given and after therapy was given for 3 days. Data were analyzed univariately for each variable looking at the frequency distribution, percentage, and average value, as well as the standard deviation of each variable. To see the difference and the effect of murottal Alquran therapy intervention using Wilcoxon test, and Mann Whitney with 95% significance level ($p < 0.05$).

RESULT & DISCUSSION

Table.1

Distribution of Variable Based on Age Gestation, Birth Weight, Length of Birth in Premature Babies With Mechanical Ventilation (CPAP) Getting a Murottal AlQuran (n = 20)

Variable	Mean	SD
Gestasional Age	32,5	3,36
Birth Weight	2375	708,5
Body Length of Birth	46	3,72
Nutritons Day-1	5	0,85
Nutritions Day-2	10,3	9,19
PEEP	8,15	5,21
Flow	7,75	0,851
FiO2	36,7	10,29

Based on table 1, it is known that the average gestational age is 32.5 weeks, with birth weight of 2,375 grams, body length of birth of 46 cm. Babies were given breastfeeding with a mean diet on the first day was 5 cc and increased to 10.3 cc after the third day. Infants use CPAP type mechanical ventilation assistance with a mean PEEP of 8.15, Flow 7.75, and Fio2 of 36.7%.

Table.2

Distribution of Heart Rate, Respiration Rate and Oxygen Saturation Before and After Given the Murottal Alquran Therapy (n = 20)

		HR (x/i) mean (SD)	RR(x/i) mean (SD)	Spo2 mean (SD)
Day	1	126,16	48,40	95,45
		(24,77)	(16,16)	(4,87)
Day	1	121,25	47,25	96,10
		(22,38)	(15,15)	(3,14)
Day	2	128,30	44,90	96,55
		(15,50)	(15,13)	(3,17)
Day	2	127,90	45,95	96,10
		(14,35)	(14,35)	(3,14)
Day	3	129,70	44,60	96,95
		(17,44)	(11,07)	(8,19)
Day	3	133,00	41,75	97,60
		(12,07)	(10,22)	(1,66)

The results of the study in Table 2 show the changes in the average value of the Heart Rate, Respiration Rate and Oxygen Saturation Before and After Given the Murottal Alquran Therapy. The mean heart rate decreased significantly on the first and second days after the AlQuran therapy, but experienced an increase on the third day but still within normal limits. The average Respiration Rate has decreased significantly from the first to the third day, which indicates an improved condition. Whereas oxygen saturation shows an increase in value from the first day to the third after therapy.

Table. 3

Mean Difference Of Heart Rate, Respiration Rate and Oxygen Saturation Before and After Murottal Alquran Intervention (n=20)

	Variables	Mean (SD)	P- Value
Heart Rate	Day 1 pre	126,16 (24,77)	0,268
	Day 1 Post	121,25 (22,38)	0,051
	Day 2 Pre	128,30 (15,50)	0,015
	Day 2 Post	127,90 (14,35)	
	Day 3 Pre	129,70 (17,44)	
	Day 3 Post	133,00 (12,07)	
	P- Value	0,053	
Respiration Rate	Day 1 pre	48,40 (16,16)	0,793
	Day 1 Post	47,25 (15,15)	0,036
	Day 2 Pre	44,90 (15,13)	0,010
	Day 2 Post	45,95 (14,35)	
	Day 3 Pre	44,60 (11,07)	
	Day 3 Post	41,75 (10,22)	
	P- Value	0,031	
Oxygen Saturation	Day 1 pre	95,45 (4,87)	0,253
	Day 1 Post	96,10 (3,14)	0,037
	Day 2 Pre	96,55 (3,17)	0,006
	Day 2 Post	96,10 (3,14)	
	Day 3 Pre	96,95 (8,19)	
	Day 3 Post	97,60 (1,66)	
	P- Value	0,017	

Based on the Wilcoxon test results in Table 3, it is known that there is no effect of

murottal Alquran therapy on Heart Rate, Respiration Rate, and Oxygen Saturation on the first day ($P > 0.05$) but on the second and third days there is an effect of murottal Alquran therapy on the Heart Rate Respiration Rate, and Oxygen Saturation ($P \leq 0.05$). The Friedman Test results show that there are significant differences in listening to the Quran's murottal on Respiration Rate ($P = 0.03$), Heart Rate ($P = 0.05$) and Oxygen Saturation ($P = 0.01$).

The results of this study showed that the majority of neonates experienced an increase in Heart Rate > 120 x / minute before performing murottal Alquran therapy, an increase in heart rate occurred on the second and third days reaching an average of 129 x / minute. But after giving murottal Alquran for 20 minutes there was a significant decrease especially on the first day of intervention. In this study also known the average respiratory rate (respiration rate) experienced by neonates before therapy is in the normal range ($45-48$ x / min) but after murottal therapy the respiratory rate has decreased significantly which indicates the level of respiratory stability of infants ($40-41$ x / minute). Majidi (2014) said in his research the effects of listening to the sound of the Alquran can reduce vital signs to be more stable (20). In addition, Mirbagher and

Ranjbar (2010) listen to the sound of the Al Quran in addition to stabilizing vital signs also have an impact on reducing anxiety in women undergoing cesarean section.

The average neonates oxygen saturation in this study before the intervention was in the range of 95.45% with a minimum value of 87%, these results indicate a decrease in oxygen saturation experienced by neonates. After the intervention of listening to the sound of the Alquran on the first day there was a significant increase in the average oxygen saturation to 96.10% and continued until the third day to 97.60% which showed improvement in the hemodynamic conditions of neonates. Study conducted by Keshavarz, et al. (2010) conducted to determine the effect of the sound of the Alquran on the physiological responses of premature neonates treated at NICU. Tehran found that the mean heart rate, and respiration rate decreased and oxygen saturation rates increased significantly compared with baseline values after intervention in neonates that were exposed to the sound of the Al-Quran.

Cetin (1999) in his research stated that the words in the AlQuran were very beautiful which were sung with a sense of rhythmic tone. Surah Arrahman delivered by

Qory Muzammil Hasbalah was read murottal (tartil) in a slow and measured tone with the correct recitation. Qory who recites every word in the surah in a good and convenient way can make someone concentrate on listening and can offer a more pleasant stimulus. According to Kirby, Olivia and Sahler (2010) revealed that listening to soothing sounds can increase relaxation, reduce perception of pain, and provide sound stimulation that will affect physiological functions. Sound sources such as soothing music can affect the autonomic nervous system and stimulate the lymphatic glands to produce endorphine and serotonin. This hormone can provide feelings of calm and play a role in reducing pain, thus making feelings more calm (Kazemi, Ghazimoghaddam, Besharat & Keshani, 2012). Given the music changes in the status of brain waves and stress hormones. Right temporal lobe activity will decrease so that the hormone cortisol is inhibited by secretion to normal levels (Halim, 2002; Snyder & Linguist, 2002). Music is played and captured by the mechanical process of entering the ear from the outside, middle, and inside. In the cochlea the sound is converted into energy and then transferred to the brain through the auditory nerve synapses, received and then

interpreted in the temporal lobe. Calm conditions can increase the body's oxygenation.

Cevasco (2005) says that soothing sounds like music are very effective in stabilizing oxygen saturation levels and there is no negative effect on apnea and bradycardia. This is because in premature neonates or those who have enough months to be able to respond to the sounds in the surrounding environment because the fetal hearing structure has been formed since the age of 7 weeks and at 18 weeks the fetus is able to hear (Gooding, 2010). Music has a rhythm that can affect the rhythm of heart rate and human breathing (Trappe, 2010). If the music that is received is a soothing and regular sound that is repeated, then the sound will give impulses to the hypothalamus to respond to the adrenal medulla glands to suppress the release of epinephrine and norepinephrine or the release of catecholamines into the reduced blood vessels. As a result, the concentration of catecholamines in blood plasma is low so that the heart rate decreases, and oxygen consumption decreases, which in turn results in slow breathing frequency (Sloane, 2004; Kirby, Olivia & Sahler, 2010).

CONCLUSION

Giving murottal Qur'an arrahman letter therapy with qory Muzammil hasballah which is carried out for 20 minutes in infants for 3 consecutive days has an effective effect on heart rate, respiration rate, and oxygen saturation in LBW infants treated in NICU treatment rooms using ventilation aids. CPAP mechanical type. The results showed there were differences in the HR, RR and SPO2 of infants on the first day of the pre-test and post-test, as well as on the 2nd and 3rd days, a significant increase was seen. Nurses are expected to be able to provide murottal quran therapy to infants undergoing treatment at the NICU, especially LBW infants with mechanical ventilation aids, so as to help increase the comfort of the baby from the processor during intensive care..

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