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SOUND OF AL-QURAN THERAPY (SAQTY) ON THE PHYSIOLOGICAL FUNCTION OF PREMATURE INFANTS IN THE NICU

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ABSTRACT

Introductory summary: *Premature infants is unstable individual. The first treatment contributes to the next quality of life for premature infants. Sound stimulation with harmonious strains reduces sound stressors in the NICU Room.*

Objectives: *This research aims to analyze the effect of Sound Of Al-Quran Therapy (SAQTY) on the physiological function of premature infants.*

Methodology: *This study used Randomized Controlled Trial (RCT), 15 premature infants received SAQTY intervention, and 15 premature infants received nature sounds. The intervention was given for six days with a duration of 30 minutes with 50-60dB as measured by Sound Level. Sampling used accidental sampling, and the statistical test used was paired T-Test.*

Results: *Data collection was carried out three times, the first day before treatment, the third day and the sixth day. The results of the p-value in the intervention group for heart rate, temperature, respiratory rate, oxygen saturation on the third day (0.001; 0.002; 0.002; 0.034) and the sixth day (0.000; 0.000; 0.001; 0.002) overall p-value <0.05 .*

Conclusion: *SAQTY has a good effect on the physiology of premature infants who are treated in the NICU. SAQTY provides relaxation that makes infants have better sleep quality so that they can become physiologically stable.*

INTRODUCTION

Premature birth causes the highest death in infants aged less than one year. Indonesia ranks fifth in mortality due to premature worldwide (Rizqiani and Yuliana, 2017)(Rizqiani and Yuliana, 2017). Being born prematurely is a condition that is quite difficult for infants because they have to adapt to a very foreign environment with physical conditions that are not optimal. The incidence of premature infants is 5.8% of births, 85% are born at the age of 32-36 weeks, 123/1000 premature births die. The

aggravating factor is congenital abnormalities because the organs are not fully form (Razeq, Khader and Batieha, 2017). During the last seventeenth years infant mortality caused by premature occupying the highest trend in Indonesia. Physiological readiness in facing extra-uterine life is the cause of premature babies having difficulties in surviving (Soleman, 2020). In Iran hospitals, 11.8% of 1,040 infants born died in the NICU, the causes of death included respiratory distress syndrome (RDS) (34.1%), asphyxia (25.2%), anomalies (10.6%), sepsis (7.3%), intracerebral hemorrhage (8.1%), pulmonary hemorrhage (7.3%), and other causes (6.4%) (Azami *et al.*, 2020).

Premature infants are significantly at risk for neurodevelopmental disorders such as cerebral palsy, mental retardation, visual and hearing impairments, cognitive decline, speech, and motor delays, behavioral disorders, and learning delays (Irwanto, 2017). Appropriate treatment in the early life of premature infants is essential to prevent lasting effects on the baby's life, such as the risk of cerebral palsy, mental retardation, visual disturbances, and hearing, decreased cognitive function, speech delays, movement disorders, behavioral disorders, emotional disorders, and learning disabilities. If this happens, it will affect the quality of life of the child in the future. Other than health conditions, the problem that premature childrens often face is academic performance and social performance (P2PTM Kemenkes RI, 2018).

At 23-25 weeks of gestation, the fetal auditory system begins to form during pregnancy. Auditory cells will be formed based on the signals sent to the brain. At week 30, the hearing function is fully formed so that the fetus can begin to hear more complex sounds (Irwanto, 2017). Effective sound stimulus is given to third trimester neonates. Treatment in the NICU sound stimulus room determines the infants further development. In a survey the voice of nurses in the NICU room is needed to help neonatus maximize development to meet the developmental needs of infants early life (Smith *et al.*, 2021).

Infants who are cared for in an incubator relatively receive noise from the sound of the tools in the NICU room. In the analysis of observations, infants who get noise above 60db cause a startled reaction, and changes in facial expressions while sleeping. This shows that infants need a soft sound stimulus to get good quality sleep (Rodarte *et al.*, 2019).

The provision of musical stimulus given to premature infants at the beginning of treatment in the NICU can improve the function of the auditory cortex and

thalamus. The music chosen is music with a regular tempo and traditional music that can increase fun and comfort responses (Lordier *et al.*, 2019). In another study that compared mother's voice and Mozart lullaby, both of them had a good effect on the physiology of premature infants including heart rate, systole, diastole, respiratory rate and oxygen saturation. Of the three groups, the best effect was when the two were combined (Shin *et al.*, 2022).

The murottal voice is a recitation of the Al Quran with a regular rhythm. Impulses received by the hypothalamus stimulate adrenaline to stimulate the muscle to experience contraction and relaxation in all organs. Maximum organ function also stimulates optimal absorption of nutrients so that murottal sounds can increase the weight of low-weight babies (Ramdaniati, Kusmiati and Sakti, 2018). In a systematic review of 5 sources obtained from Science Direct (2015-2018) and Google Scholar (2015-2018) with a quasi-experimental research design, randomized control trials related to the effect of Al Quran on infants in the NICU room were given 15-25 minutes every days with Al Isra, Yusuf, Ar Rahman, Yasin have a significant effect on babies who experience a decrease in oxygen saturation and heart rate (Devi and Rustina, 2019).

Al-Quran as a miracle revealed by Allah through the Prophet Muhammad S.A.W. brings benefits to humans. In accordance to Allah's verse in the surah Al-Isra': 82, which means "And We send down of the Qur'ān that which is healing and mercy for the believers, but it does not increase the wrongdoers except in loss."

In Islam there is a ruqyah treatment method which is useful for treating physical and non-physical ailments. The method of treatment is carried out by reciting Al Quran and praying to improve health status (Arni, 2021). The choice of therapy with the Sound Al Quran Theraphy (SAQTY) is the best appropriate choice because it does not cause adverse side effects. Premature infants are of particular concern because as individuals we should maintain their continuity as the next generation and prevent delays in growth and development. This research is expected to improve the quality of life of premature infants to reduce infants mortality in Indonesia.

METHODS AND MATERIALS

This study is a quantitative study with Randomized Controlled Trial (RCT). This study observed the physiological changes of premature infants who were treated in the NICU before and after being given SAQTY sound stimulation. Such an intervention is set to achieve the same treatment in which sound intensity is measured by a decibel meter. The time of

administration was given at the same frequency, intensity and schedule indicated by the observation sheet.

The population of this study was all infants born prematurely without any congenital abnormalities. The sampling used accidental sampling based on cases that exist in the research period with established criteria. Determination of the intervention and control groups were chosen randomly without looking at the order or division. The nurse will draw lots for each baby who has criteria to determine the intervention to be chosen. Inclusion criteria are babies with gestational age 26-36 weeks, experiencing physiological disorders, and birth weight less than 2500 gram. Exclusion criteria include indications of congenital abnormalities, parents not willing to be respondents, and severe comorbidities.

Sample size:

$$n = \frac{Z^2 1\text{-}\alpha/2\ pq}{d^2}$$

p = proportion (prevalensi) dependent variable on population (2,1%)
q = 1-p
Z1-α/2 = statistik Z (Z = 1,96 for α = 0,05)
d = delta, absolut value (5%)

$$\frac{(1,96)^2\ (1\text{-}0.05/2)\ (0,021)(1\text{-}0,021)}{(0,05)^2} = 30,6$$

From these results, the number of samples was rounded up to 30 respondents, divided into 15 treatment groups and 15 control groups. The prevalence of premature infantss in hospitals during the COVID-19 pandemic decreased, there were several things to consider in these conditions making hospital services adjust the protocol.

The research variable that consists of the independent variable in this study is SAQTY. SAQTY is the Al Quran sound stimulation with melodious waves given to premature babies for 30 minutes. The Surah given are surah Al-Fatihah, Al Ikhlas, Al Falaq, An-Nas, verse of Kursi, and two last verses of Surah Al Baqarah. The dependent variable in this study is the physiological function of premature infants. The physiological function is a response to the body's functions of premature babies as indicated by the conditions of respiratory rate, pulse rate, body temperature, and oxygen saturation. The physiological response will be measured with a nominal scale of respiratory rate, pulse, body temperature, and oxygen saturation before and after the intervention. External variables in this study were gestational age, gender, and birth weight.

The instrument in this research are use observation list temperature with thermometer, respiratory rate and pulse with timer, and oxygen saturation with pulse oxymetri.

Infants in the intervention group will be treated with SAQTY sound recordings

for 30 minutes a day for six consecutive days and natural sounds for the control group for the same period with a sound intensity of 50-60 dB measured with sound level.

Samples were divided by treatment and control groups at random. Informed consent was given to parents to collect initial data, namely physiological conditions including pulse frequency, respiratory rate, temperature, and oxygen saturation in premature infants. The post-intervention evaluation was carried out two times on the 3th and 6th day after treatment.

Based on the distribution of normality test data with Kolmogorov-Smirnov, the Asymp.Sig.(2-tiled) value of all data for both the intervention and control groups are > 0.05, that is interpreted as normal data. Therefore, the statistical analysis of the effect of SAQTY on the physiology of premature infants is the Paired simple T Test using SPSS 22.

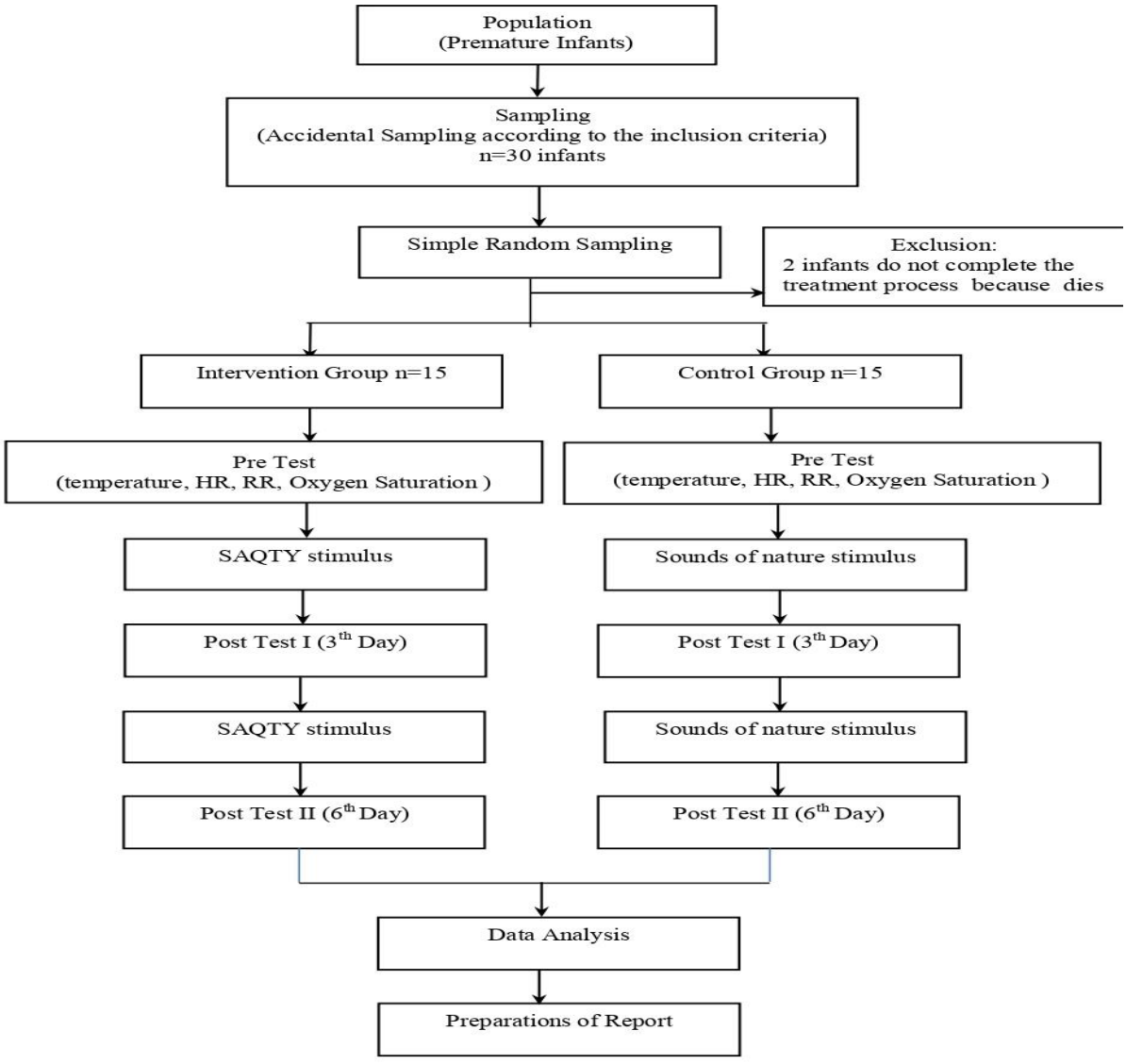

Figure 1. The Research Flow "Sound Of Al-Quran Therapy (Saqty) On The Physiological Function Of Premature Infants In The Nicu"

RESULTS AND DISCUSSION

The research was carried out from June to September 2021 at the Government Hospital in Sragen Regency. They are Region Hospital of dr. Soehadi Prijonegoro Sragen and Region Hospital of dr. Soeratno Gemolong. Prior to the research, ethical clearance was carried out by the Research Ethics Team at Region Hospital of dr. Soehadi Prijonegoro Sragen that this research is safe for the respondents. During this period, the researcher used accidental sampling, which obtained 30 respondents, where 15 infants were grouped as the intervention group and 15 infants as the control group. We present the characteristics of the respondents from the two groups in the following table and presentation:

Tabel 1. Demographic Characteristic of Intervention and Control groups

Variable	Intervention (n=15)				Control (n=15)			
	n	%	Min-Max	Mean (SD)	n	%	Min-Max	Mean (SD)
Gender ● Male ● Female	9 6	60 40			9 6	60 40		
Gestation (weeks) ● 26-28 ● 29-31 ● 32-34 ● 35-36	4 8 3	27 53 20	28-33	30(1,46)	2 7 4 2	13 47 27 13	27-35	31(2,5)
Birth Weight (gram) ● <1000 ● 1001-1500 ● 1501-2000 ● 2001-2500	4 11	37 73	1110-1870	1600(217,8)	1 1 10 3	7 7 66 20	870-2210	1733(366,8)

Table 1. showed the infants were divided into two groups, namely the intervention and control groups, with the distribution for sex having the same percentage of male and female infants. At the gestational age, the average gestational age was almost equal, namely the age range of 30-31 weeks. The control and intervention groups were mostly at the gestational age of 29-31, respectively 53% and 47%. Most of the baby's weight in the intervention group was in the range of 1501-2000 grams (73%), while in the control group, most of them were in the same weight range as much as 66%. In the control group, the distribution range was wider where babies were weighing <1000 grams and 2001-2500grams who were not in the intervention group.

Table 2. The Comparison Physiology Function Pre-Post Intervention SAQTY, interventions group (n=15) and controls group (n=15)

Variable	Pre-Post	Intervention			Control		
		Min-Max	Mean (SD)	*p Value*	Min-Max	Mean (SD)	*p Value*
Temperature	1th Day (Pre)	35,2-37	36,5(0,4)		36,4-37,6	36,9(0,4)	
	3th Day (Post)	36,5-37,4	36,9(0,3)	0,001*	36,9-37,8	37,4(0,3)	0,002*
	6th Day (Post)	36,7-37,6	37,2(0,3)	0,000*	36,2-37,8	37,0(0,4)	0,387
Heart Rate	1th Day (Pre)	125-178	151(13)		132-154	143(6)	
	3th Day (Post)	116-152	134(11)	0,002*	136-175	144(10)	0,837
	6th Day (Post)	117-138	127(7)	0,000*	135-146	140(3)	0,142
Respiratory Rate	1th Day (Pre)	36-74	53(11)		38-64	45(7)	
	3th Day (Post)	24-50	41(6)	0,002*	40-69	47(8)	0,197
	6th Day (Post)	30-48	41(6)	0,001*	40-56	46(4)	0,910
Oxygen Saturation	1th Day (Pre)	93-99	96,7(1,9)		93-98	96(1)	
	3th Day (Post)	96-100	98,4(1,2)	0,034*	96-98	97(0,8)	0,002*
	6th Day (Post)	98-100	98,9(0,7)	0,002*	98-99	98(0,4)	0,000*

*p value <0,05, significant 95%

Table 2. showed the physiological changes measured on days third and sixth after SAQTY sound stimulation. Prior to the data analysis test, a normality test was carried out with Kolmogorov-Smirnov showing the value of Asymp.Sig. (2-tiled) for the overall data, both the intervention and control groups, namely > 0.05, were interpreted as normal data. Based on the SPSS test using the Paired simple T-test, SAQTY affected the overall physiological function of temperature, pulse, respiratory rate, and oxygen saturation with the p-value <0.05. The control group given a sound stimulus in natural sounds (water gurgling) showed that the sound stimulus did not affect the physiological function of temperature, pulse, and respiratory rate with the p-value > 0.05. Pineda et al., (2017) stated that auditory stimulation had become the choice of several studies of providing auditory stimulation, with several publications said that it can be carried out in infants aged 25-28 weeks.

In the control group, the sound of gurgling water showed less effect on physiological responses. It seems to affect the temperature on the third day because the baby is in the incubator so that the body temperature immediately adjusts to the ambient temperature. Oxygen saturation also showed significant changes and was even more significant than the intervention group. Some infants in the control group were weigher than the intervention group, those with body weight above 2000gr and gestational age above 32 weeks. The organ maturation level was more mature so that with oxygen therapy, the oxygen saturation was improved immediately in the control group.

The first assessment of a newborn is the condition of his vital signs. The baby breathes spontaneously, and the pulse is

not less than 100 times per minute as a sign that the baby is in normal vital signs. In premature babies, it becomes essential because the baby's age is young, so that the vital organs are not perfect. Furthermore, the next stage of assessment is oxygen saturation to see the quality of life of infants because it is not infrequently they experience decreased oxygen saturation conditions. Vital signs measure the baby's normal conditions where the normal temperature is 36.5-37.5 0C, heart rate 120-160 times per minute, respiratory rate 40-60 times per minute, and oxygen saturation 96-100%. Premature babies are born before the maturation process, making babies not ready to live outside the mother's womb (WHO, 2018). Therefore they have a particular development period. Some physiological functions under unexpected conditions such as glucose regulation, adrenal function, thermoregulation, and immunity will change according to the liver, kidneys, and respiratory function. Physiological functions are the focus of the treatment process (Machado *et al.*, 2021).

Treatment in the NICU provides a sound stimulus that is quite disturbing for premature infants. The stimulus has an effect on physiology, autonomy and neurobehavioral. Sound stimulus replacing the presence of the mother is needed when the child is separated from the mother's care (Vitale, Chirico and Lentini, 2021). Providing a comfortable environment for babies is very necessary. In a study conducted on premature infants with a gestational age of 32-37 weeks, the noise that occurred in the NICU had a significant effect. Although we could not assess the infant's ability to hear with a device, it would appear that infants who were admitted to the NICU experienced frequent crying, and premature infants can not avoid this condition (Gouws, Swanepoel and De Jager, 2017).

Hearing function in premature infants works optimally at the gestational age of more than 32 weeks. In a study of premature infants, the ability of the audio cerebral cortex in premature infants over 32 weeks of age was the same as that of term-born infants. Hearing function decreased in very young premature infants (Bouyssi-kobar *et al.*, 2017). The infants treated in the ward got 14,110 vocabularies than the infants treated in the NICU for 16 hours, which only listened to the sound of the instrument. Therefore, auditory stimuli should be provided to infants in the NICU (Liszka *et al.*, 2019). Provision of sound stimulation with a regular tempo to premature infants in the NICU room based on research shows connectivity in the auditory cortex compared to those who only get silent sounds (Lordier *et al.*, 2019). Premature infants in the NICU who

underwent oxygen therapy for 20 minutes experienced significant changes in pulse, respiratory rate, and oxygen saturation by heard Al-Quran with surah Yasin and Ar-Rahman with p-value 0.039; 0.039; 0.009 (Majidipour *et al.*, 2018).

Al-Quran as medicine has been widely studied. Al-Quran reading can have an effect on several conditions such as anxiety or stress, pain, heart disease and even have an effect on coma (Abdekhoda and Ranjbaran, 2022). Every disease we believe there is a cure. Apart from medical treatment, there are special therapies that can be given to help healing. Muslims believe the Al Quran provides a cure for all ailments from a spiritual aspect. Based on the evidence, the voice of the Al Quran stimulates the work of the heart. Surah Al Fatihah became an option when the prophet gave treatment (Yusuff *et al.*, 2019). In this study Al Quran, the researchers used Surat Al Fatiha, An Nas, Al Falaq, Al Ikhlas, verse Kursi, and two last verses of Al Baqarah, which is read with a soft voice tempo where the formulation is called SAQTY (Sound of Al Quran Therapy. The choice of this surah is because the Surah of the Quran is used as ruqyah for someone who has physical and psychological ailments that have a calming effect.

In an analysis of the literature study of fifth articles with 360 premature infants, it was stated that the sound of Al Quran can reduce heart rate and respiration rate, increase oxygen saturation levels fourth studies mention that reciting the Al Quran effects the vital signs of premature infants, including respiratory rate, heart rate and oxygen levels in the blood. Intervention given 10-20 minutes during treatment in the NICU room (Kazemian L *et al.*, 2020).

Being in the incubator is the most comfortable place for premature babies, where most of them are born with less than normal weight and are significantly at risk of temperature loss. The study of premature babies who were given the stimulation of the sound of the Koran for seven days showed the increase of the baby's weight by adding 72.87 grams and significantly helps premature babies maintain a normal temperature and other vital signs (Ramdaniati, Kusmiati and Sakti, 2018).

Based on research on 16 babies on the first day of birth given the murottal sound of the Al Quran, there was a decrease in respiratory frequency with an average decrease of 14 times per minute. The lowest was 20 times per minute. The sound of the murottal Al-Quran gives a relaxing effect so that the respiratory frequency gradually improves (Kristyaningsih and Rahmawati, 2019). After listening to the murottal Al-Quran for three days, premature infants who were

treated in the NICU experienced an increase in oxygen saturation of 2.07%, 3.75%, 4.65% from the first day to the third day. Murottal Al-Quran can reduce baby's stress while being treated in the NICU. The stimulus can be given to babies with 34-36 weeks of gestational age (Damayanti, Ismail and Warsiti, 2018).

The provision of stimulus can be continued at home. The provision of auditory stimulus is very effective in the first three months of the baby's birth. Babies with a gestational age of 32 weeks have the same abilities as babies born at term (Cavalcanti *et al.*, 2020). Giving a stimulus with the mother's voice has a good effect on the development of premature babies. Rooming-in with the mother as soon as possible is the best choice for the development of premature babies. This can be done immediately if the baby's condition recovers and is physically ready (Filippa *et al.*, 2021). Providing information on preparation for home care for mothers with premature babies is no less important. They must immediately adapt to live their lives after leaving the NICU (Veronez *et al.*, 2017).

CONCLUSIONS AND SUGGESTIONS

Listening Al Quran, they are surah Al Fatihah, Al Ikhlas, Al Falaq, An-Nas, verse Kursi, and the last 2 verses of Al Baqarah have an effect on the physiology of premature infants including increased temperatures from an average of 36.5^{0}C to 37.2^{0}C, decreased heart rate from an average an average of 151 times per minute to 127 times per minute, decreased respiratory rate from 53 times per minute to 41 times per minute and increased oxygen saturation from 96.7% to 98.9%.

Giving Sound of Al-Quran Therapy (saqty) positively affects the physiology of premature infants treated in the nicu. The relaxation effect in infants is indicated by the fact that the infants are not fussy when given sound stimulation. During three days of stimulation to the infants, the infants' condition improved, including temperature, heart rate, respiratory rate, and oxygen saturation. The condition got better when physiological monitoring was carried out on the sixth day. Statistically, all physiological components showed a significant p-value.

Further studies are needed regarding the timing of administration of the stimulation to know the effectiveness of giving sound stimulation for a specific time in the morning, afternoon, and evening. Previously, researchers only gave it with a frequency of once a day. The addition of variables related to the development of infant reflexes can be used as a review to determine the effect of stimulation of the sound of Al Quran on premature infants.

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