

## The Effect of Tactile Touch on Changes in Vital Signs in Low Birth Weight Infants (BBLR) in the Nicu Room of Dr. MM Hospital. Dunda Limboto

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### Article Info

#### Article history:

Received 16 Dec, 2025

Revised 19 Jan, 2026

Accepted 04 Mar, 2026

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#### Keywords:

BBLR, Heart Rate, Oxygen Saturation, Tactile Touch, Body Temperature

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### ABSTRACT

BBLR is a health problem that is still a major concern in the world, including Indonesia, because BBLR babies have a high risk of experiencing disturbances of physiological functions including the respiratory system, cardiovascular and body temperature regulation which if not above has a serious impact on the baby's condition. The purpose of the study was to determine the effect of tactile touch on changes in vital signs in low-birth weight babies (BBLR) in the NICU room of dr. MM. Dunda Limboto. Quantitative research method with a pre-experiment design with a one-group pre-test and post-test design approach, the population of this study was all BBLR babies, a research sample of 20 infants with purposive sampling technique, the research instrument used a vital sign observation sheet, the data was analyzed by the Wilcoxon test. The results of the study were obtained before being given tactile touch, the majority of hypothermic body temperature was 11 infants (55%) and an average of 36.295OC, normal heart rate was 11 infants (55%) and an average of 153x/minute, and normal oxygen saturation was 15 infants (75%) and an average of 90.90%. After being given tactile touch, the majority of normal body temperature changes in 17 infants (85%) and an average of 36.580OC, normal heart rate of 15 infants (75%) and an average of 148.27x/minute, and oxygen saturation was completely normal in 20 infants (100%) with an average of 94.44%. Then body temperature  $p=0.036$ , heart rate  $p=0.006$  and oxygen saturation  $p=0.000$  ( $\leq \alpha 0.05$ ) were obtained. It can be concluded that there is an effect of tactile touch on changes in vital signs in BBLR babies in the NICU room of dr. MM. Dunda Limboto. Therefore, nurses can apply tactile touch in the nursing care of BBLR patients so as to improve nursing services.

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### INTRODUCTION

Low birth weight babies (BBLR) are one of the health problems that are still a major concern in the world, including in Indonesia. According to WHO (2020) around 15-20% of all births in the world are BBLR babies, which are babies born weighing less than 2,500 grams. In Indonesia, the incidence rate of BBLR is still quite high, and is one of the main causes of morbidity and mortality.

Babies with Low Birth Weight (BBLR) are newborns weighing less than 2,500 grams regardless of gestational age. Babies with BBLR can occur in underage babies or at full term age. A premature baby is a baby with a gestation period of less than 37 weeks or 259 days. Full-term babies are babies with a gestational period ranging from 37 weeks to 42 weeks or 259 days to 293 days (Maryunani, 2022).

Low birth weight (BBLR) is one of the important public health indicators for maternal health, nutrition, health service delivery, and poverty. In addition, it is still a significant public health problem worldwide. Babies with low birth weight are about 20 times more likely to die than newborns with a birth weight of >2500 grams. It has always been associated with long-term neurological disability, language development disorders and an increased risk of chronic diseases, including cardiovascular disease and diabetes. Premature BBLR has additional

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risks due to the immaturity of several organ systems, including intracranial hemorrhage, respiratory distress, sepsis, blindness, and gastrointestinal disorders (Ema Purwanti, 2025).

Globally, about 15% of newborns have Low Birth Weight (BBLR) due to preterm birth or intrauterine growth retardation or both, and up to 70% of neonatal deaths. The latest data obtained from research shows that 24% of babies are born prematurely. Preterm births are mostly 85% concentrated in developing countries. Premature babies with low birth weight are still a major concern in developing countries (Marnita et al., 2021). Low birth weight or commonly known as BBLR is still the main cause of infant mortality in Indonesia, according to Riskesdas data in 2018 the prevalence of BBLR in children aged 0-59 months in Indonesia is still 6.2%, the prevalence of BBLR tends to increase from year to year (Suryani, 2020b).

Data from the Gorontalo Provincial Health Office in 2023 The Neonatal Mortality Rate (AKN) of Gorontalo Province reached 4.1 per 1000 KH with the number of neonatal deaths of 76 babies, this figure has decreased compared to the achievement of AKN in 2022, which is 7.3 per 1000 KH. The main cause of neonatal mortality was caused by BBLR and Prematurity in 48 cases. As for Gorontalo regency, the number of infant deaths in Gorontalo Regency in 2023 is 1.8 per 1000 KH.

Premature babies have rudimentary physiological and behavioral development. The baby's primary needs are manifested through a variety of behaviors and responses. Premature babies have many problems adjusting to themselves soon after birth. The outside world is a great source of stress. This is exacerbated when they are treated in the Neonatal Intensive Care Unit (NICU) with various harmful stimuli such as light, sound, and invasive procedures performed for diagnostic and therapeutic purposes (Das et al., 2021)

Babies with low birth weight have a high risk of experiencing physiological dysfunction due to imbalances in the body's organs, including the respiratory, cardiovascular, and temperature systems. This causes normally, newborns have a body temperature of 36.5-37.5°C, a breathing rate of 35-40 times/minute, with a heart rate of 120-160 times/minute, and oxygen saturation of 95-100%. However, in babies, BBLR fluctuates. They tend to suffer from hypothermia due to thin body fat and immature temperature regulation mechanisms. Takipnea or apnea due to immature lungs, bradycardia or tachycardia due to impaired oxygenation, as well as decreased oxygen saturation (SpO<sub>2</sub> <90%) due to suboptimal gas exchange (Irwan & Risna, 2022).

Instability of vital signs can have a serious impact on the baby's condition. Hypothermia can lead to hypoglycemia and metabolic acidosis, respiratory distress can lead to hypoxia, while prolonged deprivation of oxygen saturation can cause brain, heart, and kidney damage. (Rahayu & Dewi, 2022). Therefore, proper monitoring and intervention are necessary to help stabilize the physiological condition of BBLR babies.

The provision of nursing interventions can improve the health of babies born with BBLR, one of which is the provision of tactile touches. Touch therapy is a non-pharmacological therapy that is used to provide sensory stimulation through gentle touch that is carried out to provide a calming effect, increase circulation, and help regulate the baby's temperature and breathing. In newborns who can provide positive stimuli (Field, 2017). Several studies have shown that tactile touch can increase body weight, improve breathing patterns, decrease abnormal heart rate, and increase oxygen saturation in premature babies and BBLR (Rahayu & Dewi, 2022)

Based on a preliminary survey at dr. MM dunda Limboto Hospital, the number of low-birth weight babies (BBLR) who have been treated during 2023 is 152 babies and in 2024 there will be 157 babies. And data on the last 1 month of BBLR babies treated as many as 20 BBLR babies. The results of initial observation of 4 BBLR babies were obtained data, 3 of which had problems with respiratory disorders and 1 infant experienced hypothermia. The results of interviews with 2 NICU nurses were obtained information that so far the treatment to overcome the BBLR problem is mainly related to the improvement of vital signs using incubators and the administration of drugs, while the nursing actions given in the form of the administration of the Kangaroo Method and tactile touch have not been carried out optimally due to the limitations of the nurses and the confidence of the nurses in its effectiveness. Based on the description of the problem that has been stated above, the researcher is interested in conducting an in-depth study on the effect of tactile touch on changes in vital signs in low-birth weight babies (BBLR) in the NICU room of dr. MM Hospital. Dunda Limboto, so that the results can be the basis for the application of evidence-based nursing interventions.

## RESEARCH METHODS

The method used in this study is quantitative research with a pre-experimental design, namely through a one-group pre-test and post-test design approach, which is an experimental study that uses one group where before the intervention is given, vital signs (body temperature, heart rate, oxygen saturation) will be measured in BBLR babies then will be given tactile touch intervention and after that it will be carried out return measurement after tactile touch to BBLR infants

This research has been carried out in the NICU Room of the Hospital. Dr. MM. Dunda Limboto which has BBLR baby care facilities. The selection of this location allows nursing intervention in the form of tactile touch to be generally safe and controlled. The research time was conducted from November 18-December 19, 2025.

## Data Analysis Techniques

### Univariate Analysis

Univariate analysis is used for each variable, in this analysis each variable aims to explain or describe the characteristics of the respondents and the vital signs of the baby (Notoatmodjo, 2018). Includes: body temperature, heart rate, oxygen saturation.

### Bivariate Analysis

Bivariate analysis was carried out to determine the effect of tactile touch on changes in vital signs of BBLR infants was carried out using SPSS 23.0 software. Pre-test and post-test data from respondents on the vital sign measurement variable with the interval data scale of one group in pairs was tested for data normality with the Shapiro Wilk Test obtained from the test results, pre-test and post-test vital sign data were not distributed normally, so the researcher in bivariate analysis used the non-parametric Wilcoxon test.

## RESULTS

### Respondent Characteristics

Table 1 Demographic Characteristics of BBLR in the NICU Room of dr. M.M.Dunda Limboto

Yes	Respondent Characteristics	Quantity	Percentage (%)
1	<b>Gender</b>		
	Male	5	25
	Women	15	75
	Total	20	100
2	<b>Gestational Age</b>		
	28 weeks	2	10
	30 weeks	2	10
	32 weeks	4	20
	34 weeks	6	30
	35 weeks	2	10
	36 weeks	4	20
	Total	20	100
3	<b>Birth Weight</b>		
	BBLR	17	85
	BBLSR	3	15
	Total	20	100

Source: Primary Data, 2025

The table above shows that based on gender, the most are female, which is 15 respondents (75%), the gestational age is 34 weeks, which is 6 respondents (30%) and at least 28 weeks of age, 2 respondents (10%), 30 weeks as many as 2 respondents (10%) and 35 weeks as many as 2 respondents (10%). The highest birth weight was categorized as BBLR as many as 17 respondents (85%).

### Univariate Analysis

#### Vital Sign Before Being Given a Tactile Touch on BBLR in the NICU Room of dr.M.M. Dunda Limboto Hospital

Table 2 Vital Sign Pre Test Given a tactile touch to BBLR in the NICU Room of dr. M.M.Dunda Limboto

Yes	Vital Signs Before Intervention	Quantity	Percentage (%)
1	<b>Body Temperature</b>		
	Normal	9	45
	Hypothermia	11	55
	Total	20	100
2	<b>Heart Rate Frequency</b>		
	Normal	11	55
	Bradycardi	1	5
	Tachycardia	8	40
	Total	20	100
3	<b>Oxygen Saturation</b>		
	Normal	15	75
	Hypoxemia	5	25
	Total	20	100

The table above shows that before being given tactile touch, the majority of respondents had their body temperature categorized as hypothermia as many as 11 respondents (55%). Before being given tactile touch, the heart rate was mostly categorized as normal as 11 respondents (50%) and at least 1 respondent (5%) was categorized as bradycardia as low as 1 respondent (5%). Oxygen saturation before being given tactile touch was mostly categorized as normal by 15 respondents (75%).

### Vital Sign After Being Given A Tactile Touch To BBLR In The NICU Room Of Dr. M.M.Dunda Limboto

Table 3 Vital Sign Post Test Given a tactile touch to BBLR in the NICU Room of dr. M.M.Dunda Limboto

Yes	Vital Signs After Intervention	Quantity	Percentage (%)
1	Body Temperature		
	Normal	17	85
	Hypothermia	3	15
	Total	20	100
2	Heart Rate Frequency		
	Normal	15	75
	Tachycardia	5	25
	Total	20	100
3	Oxygen Saturation		
	Normal	20	100
	Hypoxemia	0	0
	Total	20	100

Source: Primary Data, 2025

The table above shows that after being given tactile touch, the majority of respondents had their body temperature categorized as normal as many as 17 respondents (85%), after being given tactile touch, the heart rate was mostly normal as many as 15 respondents (75%) and oxygen saturation after being given tactile touch was generally normal as many as 20 respondents (100%).

### Bivariate Analysis

Table 4 Wilcoxon Test Analysis Results

Vital Sign	N	Red	p-value
<b>Body Temperature (°C)</b>			
Before tactile touch	20	36,295	0,036
After tactile touch		36,580	
<b>Heart Rate Rate (x/minute)</b>			
Before tactile touch	20	153,00	0,006
After tactile touch		148,27	
<b>Oxygen Saturation (%)</b>			
Before tactile touch	20	90,90	0,000
After tactile touch		94,44	

Source: Primary Data, 2025

The table above shows the mean or average body temperature of the respondents before being given tactile touch, which is 36.295°C and after tactile touch, which is 36.580°C with a p-value of 0.036 ( $<\alpha$  0.05), meaning that there is an effect of tactile touch on changes in body temperature in low-birth weight infants (BBLR) in the NICU Room of dr. M.M.Dunda Limboto.

The average heart rate of the respondents before tactile touch was 153x/minute and after tactile touch was 148.27x/min with a p-value of 0.006 ( $<\alpha$  0.05), meaning that there was an effect of tactile touch on changes in heart rate frequency in low birth weight infants (BBLR) in the NICU Room of dr. M.M.Dunda Limboto.

The average oxygen saturation of the respondents before tactile touch was 90.90% and after tactile touch was 94.44% with a p-value of 0.000 ( $<\alpha$  0.05), meaning that there was an effect of tactile touch on changes in oxygen saturation in low-birth weight babies (BBLR) in the NICU Room of dr. M.M.Dunda Limboto.

Based on the table above, it can be seen that tactile touch affects oxygen saturation the most because the p-value is very significant, which is 0.000 compared to body temperature and heart rate frequency, and all respondents experience changes in oxygen saturation after being given tactile touch.

## DISCUSSION

### **Vital Sign Before Being Given A Tactile Touch To BBLR In The NICU Room of Dr. M.M.Dunda Limboto Body Temperature Before Being Given Tactile Touch on BBLR**

The results showed that before the respondents were given tactile touch interventions, namely the body temperature, the majority of respondents were categorized as hypothermia as many as 11 respondents (55%) with an average body temperature of 35.2 OC. This is because based on the observation results of the body temperature of these respondents is less than 36.5OC, which is 35.2OC, where the body temperature of newborns of <36.5OC is included in hypothermia.

Respondents whose body temperature before being given tactile touch were categorized as hypothermic in 11 respondents because the baby's skin looked pale and felt cold, especially on the extremities. In addition, it can also be caused by the temperature environment of the incubator which is adjusted to the age and weight of the respondents, where all respondents in this study are 1 day old with different birth weights, namely from 11 there are 3 respondents whose birth weight ranges from 1400-1450, the incubator is regulated at a temperature in the range of 33.3-34.8 OC for the baby's body weight of 1200-1500 grams and there were 8 respondents whose birth weight ranged from 1700-2450, the incubator was set at a temperature in the range of 32.2-33.8 OC for a baby's body weight of 1501-2500 grams so that the respondents had a body temperature classified as hypothermia with a temperature of <36.5OC because even though they were in the incubator, the temperature of the incubator was adjusted to age and weight so that the baby in the incubator temperature environment did not overheat if the temperature height or not according to age or weight.

Babies with low birth weight are very susceptible to hypothermia, namely body temperature <36.5OC. Because babies with BBLR are very crucial prone to hypothermia due to the immaturity of the thermoregulatory system and the relatively large surface area of the body. The use of an incubator is the main method to keep the baby's ambient temperature warm and stable with an adjusted incubator temperature between 29-32 OC depending on the weight and age of the baby (Yusuf et al., 2025).

The results of this study are supported by research Andari et al (2022) which states that there is a relationship between body weight and body temperature of newborns, where the weight of babies included in BBLR mostly experiences hypothermia in the Perinatology Room of dr. Soebandi and newborn weight gain has a risk of 0.6 times the change in body temperature of newborns.

In this study, it was shown that out of 20 respondents, there were 9 respondents (45%) whose body temperature was classified as normal before being given tactile touch with the average body temperature of the respondents being 36.9OC. Respondents whose body temperature is categorized as normal are because when the researcher took a body temperature measurement before giving it, body temperature measurements were obtained in the range of 36.5OC-37.5 OC.

Respondents whose body temperature was normal before being given tactile touch because according to the researcher there was an indirect effect of the administration of antibiotics in the form of vicilin given to the respondents, where antibiotics can prevent infections that can cause hypothermia so that the administration of this antibiotic can maintain the respondent's body temperature in the normal range.

The normal temperature in newborns is around 36.5OC-37.5OC. Vital signs such as body temperature are important indicators of general health and the way the body reacts to certain conditions such as infections, then deviations in vital signs of body temperature can be an indication of a health disorder such as infection so that by giving antibiotics can help fight infection (Scott, et al., 2025). Preventive administration of antibiotics to prevent infection, especially in high-risk situations such as patients with weakened immune systems such as BBLR babies (Arfijanto et al., 2025). The immune system of babies with BBLR is weaker because immunoglobulins and mature immune cells are usually only obtained through the placenta in the third trimester, but because BBLR babies have less gestational age than the third trimester, as a result, BBLR babies are more susceptible to infection. This condition can worsen the health of the baby, namely a small fat mass compared to babies with normal birth weight, where the fat mass is important to maintain body temperature and protect the body (Andriyani et al., 2025).

Findings in the study Rohmadhona et al (2016) also mentioned that even though babies with low birth weight, there are some babies whose body temperature is still classified as normal, namely in 4 babies (8.9%) with BBLR at Pandan Arang Boyolali Hospital.

The researcher's assumption is that babies with BBLR have a high risk of hypothermia due to the limited amount of fat tissue so that the ability to retain body heat is low. However, babies with BBLR also have normal body temperature due to the administration of antibiotics.

### **Heart Rate Frequency Before Tactile Touch Is Given On BBLR**

Based on the findings of the study, respondents with BBLR found that most of the heart rate was normal which was found in 11 respondents (55%) with an average of 144.7x/minute. This is because when observations were made of the respondents' heart rate frequencies in the range of 120-160x/minute so that these respondents had their heart rates categorized as normal.

Respondents whose heart rate was normal before tactile touch was given because the respondents did not have comorbidities related to the cardiovascular system or complications in the heart, the heart rate of the respondents could remain in the normal range and it was seen that these respondents were calmer than other respondents.

The same theory in Irwan & Risna (2022) It also states that the normal heart rate of newborns is 120-160 x/minute. In Witartiningsih & Aniroh (2022) mentioning that the heart rate is within normal limits because the body temperature of babies who experience BBLR is average hypothermia which results in the body will respond by increasing cell metabolism and oxygen needs, then the work of the heart will increase so that the heart whose contractility increases will be in line with the increase in pulse frequency which has an impact on the normal heart rate of the baby.

This is also found in research Nurcahati et al (2016) which shows that the average baby with BBLR has a heart rate of 137.18x/minute where this average is normal for newborns.

The results of the study were obtained before BBLR patients were given tactile touch from 20 babies, there were 8 infants (40%) whose heart rate was categorized as tachycardia with an average heart rate of 174.4x/min, where this average was included in tachycardia >160x/min. This is because the condition of BBLR affects the patient's heart function which can be improved.

Respondents who were previously given tactile touch with heart rate frequency were categorized as tachycardia because these respondents were judged from the diagnosis of the respondents, namely 6 respondents were medically diagnosed with respiratory distress and 2 respondents were medically diagnosed with RDN (Respiratory Distress Newborn) or neonatal respiratory distress syndrome which can have an impact on the heart rate of the respondents. Therefore, according to researchers, acute respiratory distress and RDS can have an impact on the heart rate of tachycardia.

Shortness of breath in babies is often related to a rapid heartbeat or tachycardia because the heart has to work hard to pump blood and oxygen to the body (Aryunani et al., 2022). Meanwhile, the same thing also happens in babies diagnosed with RDS can cause tachycardial infarction because the baby's lungs work hard as a result of the lack of surfactants so that the baby's oxygenation becomes poor and the heart has to pump faster to compensate (Yadav & Lee, 2023).

As obtained in research Prasojo et al (2025) based on the results of observations Vital Sign BBLR patients using 2 subjects of BBLR babies, both of which had a heart rate in the tachycardial category or an increase in heart rate.

In the results of this study, the researcher found that there was 1 respondent (5%) whose heart rate was bradycardia with a heart rate of 73x/minute. The respondent's heart rate was classified as bradycardia because the baby's heart rate was slower than normal, which was <100x/minute when observed before being given tactile touch.

Respondents whose heart rate was categorized as bradycardia before tactile touch was given by the researcher because the respondent was medically diagnosed, namely hypothermia, in addition to being diagnosed with BBLR and the respondent appeared weak so that this condition caused the respondent to experience bradycardia.

Hypothermia can lead to bradycardia because a decrease in body temperature inhibits the heart's electrical activity, especially in the natural pacemaker (sinoatrial node), so that electrical impulses run slower and heart rate decreases. Babies are a very vulnerable group because their body temperature regulation ability has not been optimally developed, so a significant drop in temperature can disrupt the heart's electrical system as well as the body's overall metabolism (Dewi et al., 2025).

Supported by research Ramadhani & Maryatun (2024), obtained from the results of measuring the heart rate of BBLR patients at Wonogiri Hospital, there are those who experience bradycardia with a heart rate of 93x/minute.

The researcher's assumption is that even though the baby has a lower than normal weight, the majority of the cardiovascular system of BBLR babies in this study is still functioning well enough to maintain a stable heart rate due to the body's compensation for the hypothermia condition experienced by BBLR babies.

### **Oxygen Saturation Before Being Applied to the BBLR**

The results of the study were obtained by respondents in this study that the oxygen saturation or SPO2 was dominated by normal oxygen saturation with the number of respondents as many as 15 infants (75%) with an average normal oxygen saturation of 91.8%, because when oxygen saturation observations were carried out before being given intervention, these respondents had SPO2 in the range of 90-100%.

Respondents whose oxygen saturation was categorized as normal before being given tactile touch because their breathing patterns were regular and seemed calm, and the incubator temperature regulation was adjusted to the respondent's weight and age which responded well to the respondent's body resulting in normal oxygen saturation.

Oxygen saturation in newborns is normally 90-100% and BBLR babies with normal oxygen saturation due to an increase in oxygen levels in this case because the relatively young baby's age is less than one, there is

still a residual phase of hemoglobin accumulation until the baby gets nutritional input. In addition, babies who get comfort, the body's metabolism will decrease so that oxygen saturation will increase. The oxygen in each molecule is bound by hemoglobin, so oxygen saturation will be affected if the blood lacks hemoglobin levels. Then, the use of an incubator that provides an environment with controlled temperature, humidity and oxygen concentration can help the stability of the baby's condition, including in the efficiency of oxygen uptake (Witartiningsih & Aniroh, 2022).

Research by Khoiriyah & Wiwin (2024) obtained based on observations before being given the intervention of BBLR patients showed normal oxygen saturation of 95%. Strengthened by research Wea (2024) Babies with low birth weight have an average oxygen saturation of 92.3% which is also normal.

The results of the study found that there were 5 babies (25%) who before being given tactile touch experienced hypoxemia with an average of 88.2%. The oxygen saturation respondents were classified as hypoxemia because from the results of the oxygen saturation monitoring of the respondents <90% because the respondents' immature body functions tended to be unstable.

Respondents whose body temperature was categorized as hypoxemia before being given tactile touch because the respondents' breathing patterns were irregular, seemed fussy and breathing seemed shallow, and 4 out of 5 respondents were diagnosed by the media, namely respiratory distress which resulted in problems with the respondent's oxygen saturation in the form of hypoxemia.

The difficulty of low birth weight babies adapting to the environment and the instability of physiological functions, namely oxygen saturation which has an impact on the percentage of hemoglobin binding by oxygen (SPO2) which tends to decrease (Sapitri et al., 2023). Supported by research findings Witartiningsih & Aniroh (2022), which shows the physiological response of low-birth weight infants have an average oxygen saturation of 94.40% meaning <90%

The researchers assumed that the respiratory stability of most of the respondents was in a stable respiratory function condition with an SPO2 range of 90-100% before the intervention, which suggests that the respiratory compensation mechanism of these infants was still functioning well despite having a history of low birth weight.

### **Vital Sign After Being Given a Tactile Touch on BBLR in the NICU Room of dr.M.M. Dunda Limboto Hospital**

#### **Body Temperature After Being Given Tactile Touch on BBLR**

Based on the results of the study, it was obtained from before the intervention that a total of 11 babies (55%) whose body temperature was hypothermic with an average of 35.2OC and after being given tactile touch, most of them experienced changes, namely body temperature became normal with the number of respondents as many as 17 respondents (85%) with an average of 36.8OC, where there was an average increase of 1.6OC Between body temperature before and after tactile touching is carried out so that it can be seen that tactile touch can make the body temperature of the respondent from hypothermia normal.

Respondents whose body temperature became normal after tactile touch was done because before being given tactile touch, the respondent's skin was cold, slightly moist, felt cold which was then given a tactile touch causing the baby's skin to feel warmer, redness and extremities no longer felt cold than before so that their body temperature became normal.

Tactile touch can cause changes in body temperature caused by direct contact with the skin through tactile touch from the researcher's skin to the respondent which causes the respondent's skin to detect a heat sensation which causes the respondent's skin to become warmer than before being given tactile touch.

This tactile touch therapy can be a means of facilitating the fulfillment of physiological needs because this therapy uses direct contact on the baby's skin because newborns find it difficult to regulate their body temperature properly, especially BBLR so that with touch therapy whose therapy touches the baby's skin, it can help warm the body of babies who experience hypothermia (Nurseha et al., 2024). These results and theories are strengthened by research Marnita et al (2021) which shows the results that there is an increase in body temperature in BBLR given tactile stimuli.

Based on the findings in this study, there were 3 respondents (15%) with an average of 35.9OC, whose body temperature was still categorized as hypothermic even though they had been given tactile touch interventions, so it can be seen that there has been no change in body temperature for these respondents.

Respondents whose body temperature was categorized as hypothermia after being given tactile touches because judging from the characteristics of the respondents, namely gender, these 3 respondents were female. In addition, 1 of these 3 respondents based on the characteristics of the respondents, namely their birth weight is included in the BBLSR (Very Low Birth Weight) which is <1500 grams. Therefore, it can be known that gender and birth weight, especially BBLSR, affect the patient's body temperature even though the researcher has provided a tactile touch.

Gender, namely female, can affect the body temperature of babies with low birth weight because female babies with low birth weight tend to experience body temperature disturbances due to a lower amount of subcutaneous fat in female babies than in male babies. Babies with very low birth weight (BBLSR) have lower

body temperature due to a thin layer of subcutaneous fat, a high body surface to weight ratio, little brown fat reserve, and immature organs, causing them to lose heat more easily through evaporation, conduction, convection, and radiation, making them prone to hypothermia (Andari et al., 2022).

Strengthened by research Witartiningsih & Aniroh (2022) which shows that babies with BBLR who after male sex therapy all experience a normal increase in body temperature, compared to female BBLR babies. Other research by Andari et al (2022) There is a relationship between body weight and body temperature of newborns with p-value 0.035 (<0.05) and respondents with very low birth weight (BBLSR) all experienced hypothermia.

Researchers assume that the administration of tactile touch therapy to babies with low birth weight (BBLR) is assumed to increase the baby's body temperature from hypothermic to normal body temperature. Direct contact with the baby's skin can help the thermoregulatory process that has not been optimally developed in BBLR. However, the effectiveness of increasing body temperature through tactile touch is thought to be influenced by the characteristics of the baby, particularly gender, where infant girls with BBLR tend to have less subcutaneous fat reserves and are therefore at risk of remaining hypothermic even after the intervention has been given

### **Heart Rate Frequency After Being Given Tactile Touch on BBLR**

The results showed that the heart rate before the intervention had the most normal heart rate frequency, which was 11 babies (55%) with an average of 144.7 x/minute and after being given tactile touch many babies experienced changes in heart rate frequency, where from the previous 11 babies who had normal heart rate and after tactile touch increased to 15 babies (75%) with an average of 136.6 x/minute so that it can be seen that more Respondents who experienced a change in heart rate frequency after being given tactile touch with a change difference of 8.1x/minute because the touch allowed physiological changes in the patient's heart rate.

Respondents whose heart rate was categorized as normal after being given tactile touch because previously the baby looked restless and his heart rate was unstable, which was then given tactile touch, the respondent looked calmer, his heart rate was more stable and regular, so this resulted in the respondent's heart rate being normal.

Tactile-kinesthetic stimulation is a type of developmental treatment that is believed to help maintain the physiological stability of the baby, one of which is in the regulation of heart rate. In addition, the touch given can reduce stress and anxiety in babies, caused by the process of adjustment from the intrauterine to extrauterine environment, by increasing the neuroendocrine response in BBLR babies, so that the baby's heart rate becomes more stable. Gentle touches provided through tactile-kinesthetic stimulation have been shown to soothe or reduce stress in premature babies, who tend to experience more stress (Juwita et al., 2023).

Supported by research Marnita et al (2021) It was obtained that before the intervention, the average heart rate of BBLR patients was 138.20x/min and after the intervention, tactile touch changed at 137.15x/min. So, from the results of previous research, theories and research, researchers assume that before the intervention, some babies experience bradycardi and Takkardi which indicates a disturbance in their heart rate. However, after being given an intervention Tactile touch, Most babies experience Improved heart rate stability, with more babies experiencing changes towards a more normal heart rate.

The results of the study were obtained after being given tactile touch on BBLR, there were 5 infants (25%) whose heart rate was tachycardial with an average heart rate of 170.8x/minute, where this value was more than the normal limit which is included in the category of tachycardial heart rate >160x/min) so that even though tactile touch therapy had been given, the respondents' heart rate was still classified as tachycardia.

Respondents who were given tactile touch, but their heart rate frequency was still categorized as tachycardia because 4 patients were medically diagnosed with hypothermia and 1 patient was medically diagnosed with respiratory distress, so according to the researcher, there was no change in heart rate frequency after being given tactile touch, which could be due to the medical condition of BBLR patients in the form of respiratory distress.

Hypothermia can result in changes in the body's metabolism that result in heart dysfunction as a result of the patient's faster heart rate or tachycardia. Respiratory distress in babies often triggers an increase in heart rate (tachycardia), because the heart tries to compensate for the lack of oxygen in the body by increasing the speed of blood pumping (Lunan et al., 2023).

Based on the results of research, theoretical studies, and previous research, researchers assume that tactile touch has an influence on changes and stability of heart rate in low-birth weight (BBLR) infants. Before the intervention, some babies experienced heart rate instability characterized by bradycardia and tachycardial conditions due to physiological adaptation processes and environmental stress. After being given tactile touch, most babies show changes in heart rate in a more stable and normal direction, which is thought to occur due to the effect of touch in lowering stress and improving the baby's physiological response. However, in BBLR babies with certain medical conditions such as hypothermia and respiratory distress, tactile touch has not been able to provide optimal changes to heart rate due to metabolic and respiratory disorders that affect the work of the heart.

Therefore, the effectiveness of tactile touch on the heart rate of BBLR babies is also influenced by the underlying clinical condition.

### **Oxygen Saturation After Being Given Tactile Touch on BBLR**

The results of this study based on the vital signs of oxygen saturation (SPO<sub>2</sub>) showed that before being given more tactile touches which were normal with a total of 15 respondents (75%) with an average of 91.8% and after BBLR patients were given tactile touch interventions, all respondents were no longer with oxygen saturation classified as hypoxemia or all SPO<sub>2</sub> respondents were normal which was found in 20 respondents (100%) with an average of 95.3%. This means that there is a change in oxygen saturation from before and after being given a tactile touch.

All respondents who experienced a change in oxygen saturation became normal after being given a touch of tactics because it was previously obtained that the respondent's breathing pattern was irregular, fussy and shallow breathing, but after being given tactile stimulation, it was seen that the respondent's breathing pattern was more regular, the baby was more relaxed or calm and comfortable so that this had an impact on the normal oxygen saturation of the respondents.

Tactile stimulation applied to babies with low birth weight, which includes a combination of touch and movement, serves to facilitate blood circulation, so that it can increase oxygen supply and help optimize the movement of respiratory muscles in babies which can be seen from the breathing pattern because the breathing process involves the rhythmic contraction and relaxation of several muscles. Good performance of the circulatory system and respiratory muscles will be directly related to SPO<sub>2</sub> status in BBLR (Sutarmi, 2020). Supported by research Sudaryanto & Sowwam (2023), the average SPO<sub>2</sub> of the intervention group after being given tactile stimulation was 90.14%.

The researchers' assumption of tactile-kinesthetic touch in BBLR has a positive impact on the physiological balance of infants, with an increase in body temperature, an increase in heart rate stability, and normalization of oxygen saturation. This therapy has been proven to not only help regulate the physiological functions of the baby's body, but also reduce stress and support the baby's extrauterine adaptation process more effectively.

### **The Effect of Tactile Touch on Body Temperature Changes in BBLR in the NICU Room of dr. M.M.Dunda Limboto**

Based on the results of the study, it was found that there was an effect of tactile touch on changes in body temperature in BBLR because the mean value of body temperature before was 36.2950C and the mean value after tactile touch was 36.5800C with a difference of 0.2850C which showed a significant change in the body temperature of BBLR patients before being given tactile touch and after being given tactile touch.

There was a change in body temperature in these respondents because the respondents were given tactile touch given 3 times a day for 5-10 minutes starting by placing the palm on the forehead and rubbing slowly with the palm to the base of the neck and back to the neck, using 2-3 fingers of both hands and making movements from the nape of the neck to the shoulders and elbows and vice versa back to the nape of the neck, Use the finger pads of both palms at the same time and gently massage both sides of the spine from the neck to the buttocks and back to the neck without pressing on the spine, use the pads of the fingers of both palms at the same time and massage the backs of both feet simultaneously from the groin to the ankle and back to the groin, finally massage the back of both arms simultaneously from the shoulders down to the wrists and back to the shoulders. At the time of touch, a mechanism of body temperature transfer from the researcher's skin to the baby's body appears which causes the body temperature of BBLR patients to become stable or undergo changes.

Tactile touch works by increasing the baby's body temperature through a mechanism Conduction, i.e. the transfer of heat from the therapist's body that is warmer to the baby's body through skin-to-skin contact. The skin acts as a thermoregulation, where it occurs Vasoconstriction which affects the amount of blood flow from the heart to the skin, as well as the regulation of heat loss and body sensation. The skin, subcutaneous tissues, and body fat retain heat, while the surrounding 30% blood flow which passes through the skin that contains a lot of blood vessels, bringing heat to the surface of the skin. The heat then moves from the blood through the walls of the blood vessels to the skin and is eventually lost to the environment through the process of heat loss. If the body's core temperature drops too low, Hypothalamus will trigger Vasoconstriction, reduces blood flow to the skin, which causes the skin to feel cold. When the cold sensor detects a low temperature, the hypothalamus signals to generate heat by reducing heat output through Vasoconstriction, shivering, and releases epinephrine which increases the metabolism of cells, thus producing more heat (Farida & Yuliana, 2017).

Research results Anuhgera & Ritonga (2018) The average temperature of the baby before being given tactile touch therapy was 36,2550C and after being given a tactile touch to 36,6550C, and p-value 0.001 which indicates that there is a significant influence between the body temperature of BBLR babies before and after the administration of touch therapy with an increase of 0.40C.

The researchers' assumption tactile touch works through a conduction mechanism, which involves the transfer of heat from the outside of the baby's warmer body to the baby's body through skin-to-skin contact. This

can affect the thermoregulatory process, where the BBLR baby's body is able to absorb the heat needed to keep the body temperature stable.

### **The Effect of Tactile Touch on Changes in Heart Rate Frequency in BBLR in the NICU Room of dr. M.M.Dunda Limboto**

Based on the results of the study, it was found that there was an effect of tactile touch on changes in heart rate frequency in BBLR because the mean value of heart rate frequency before tactile touch was 153.00x/min and the mean value after tactile touch was 148.27x/minute with a difference of 4.73x/minute which showed a significant change in the heart rate of BBLR patients before being given tactile touch and after being given touch tactile.

The heart rate frequency that changes from before and after being given tactile touch because the respondent is given tactile touch is given 3 times a day for 5-10 minutes which starts with placing the palm on the forehead and rubbing slowly with the palm to the base of the neck and back to the neck, use 2-3 fingers of both hands and make movements from the nape of the neck down to the shoulders and elbows and vice versa back to the nape of the neck, Use the finger pads of both palms at the same time and gently massage both sides of the spine from the neck to the buttocks and back to the neck without pressing on the spine, use the pads of the fingers of both palms at the same time and massage the back of both legs simultaneously from the groin to the ankle and back to the groin, finally massage the back of both arms simultaneously from the shoulder down to the wrist and back to the shoulder which Having an impact, tactile touch can cause relaxation that can facilitate blood flow to the heart so that the heart rate decreases or increases, which can eventually affect the value of the heart rate improving or normalizing.

The administration of tactile-kinesthetic stimulation is a form of developmental care that plays a role in supporting physiological stability, such as heart rate. This touch can help reduce stress in babies who are adjusting from the intrauterine environment to the extrauterine, by increasing the neuroendocrine response in BBLR babies so that the heart rate becomes more stable. In addition, gentle massage includes tactile stimulation, able to reduce stress in premature babies during the hospital treatment period (Hastuti & Juhaeriah, 2016).

Relevant to research Sudaryanto & Sowwam (2023) which stated that there was a significant effect of providing kinesthetic tactile stimulation on heart rate stability in BBLR with an average heart rate of 144x/minute.

Researchers assume that tactile-kinesthetic stimulation has a calming effect on BBLR babies, thereby lowering heart rate. A decrease in mean heart rate from 153x/min to 148.27/min after being given tactile touch suggests that this stimulation can help babies adjust to the extrauterine environment and reduce physiological stress. Thus, tactile-kinesthetic stimulation acts as an effective non-pharmacological intervention in improving physiological stability in BBLR.

### **The Effect of Tactile Touch on Changes in Oxygen Saturation in BBLR in the NICU Room of dr. M.M.Dunda Limboto**

Based on the results of the study, it was found that there was an effect of tactile touch on changes in oxygen saturation in BBLR because the mean value of the oxygen saturation frequency before tactile touch was 90.90% and the mean value after tactile touch was 94.44% with a difference of 3.54% which showed a significant change in the heart rate of BBLR patients before being given tactile touch and after being given tactile touch.

Tactile touch can affect the oxygen saturation of the respondent because the respondent is given tactile touch given 3 times a day for 5-10 minutes which starts with placing the palm on the forehead and rubbing gently with the palm of the hand to the base of the neck and back to the neck, use 2-3 fingers of both hands and make movements from the nape of the neck straight down to the shoulders and elbows and vice versa back to the nape of the neck, Use the pads of the fingers of both palms at the same time and gently massage both sides of the spine from the neck to the buttocks and back to the neck without pressing on the spine, use the pads of the fingers of both palms at the same time and massage the back of both legs together from the groin to the ankle and back to the groin, finally massage the back of both arms simultaneously from the shoulders down to the wrists and back to the shoulders that can be Increase blood flow in the respondent's body, including the lungs which maximize oxygen transport in the blood so that oxygen saturation becomes normal.

Tactile therapy is a touch-based therapy that can support the development of motor skills in infants. Skin-to-skin contact actively promotes the baby's motor skills while lowering cortisol levels. In addition to stimulating an increase in beta-endorphins, the therapy also stimulates the secretion of serotonin in the hypothalamus and the production of growth hormone in newborns. Tactile stimulation plays a role in calming babies as well as helping them adjust to post-natal stress after intrauterine adaptation. In addition, this therapy makes the heart rate more stable, breathing more regular, and increases oxygen saturation (SpO<sub>2</sub>) levels in babies (Elmoneim et al., 2020).

Supported by research Sowwam et al (2023) It was found that there was an effect of tactile touch on the stability of oxygen saturation/SPO<sub>2</sub> of BBLR infants with p-value 0.003. The results of the same study are Asmiati (2020) indicates that there is a significant difference in heart rate between before and after tactile touch.

The researchers assume that there is a significant change in the heart rate of babies BBLR before and after tactile touch and that with tactile therapy this helps to calm the baby, so that the heart rate becomes more stable by stimulating hormones such as beta-endorphins, serotonin and growth hormones.

## CONCLUSION

Vital sign before being given a tactile touch on BBLR in the NICU Room of dr. M.M.Dunda Limboto, body temperature is mostly hypothermic, heart rate is mostly normal and oxygen saturation is mostly normal.

Vital sign after being given a tactile touch to BBLR in the NICU Room of dr. M.M.Dunda Limboto, body temperature is mostly normal, heart rate is mostly normal and oxygen saturation is completely normal.

There was an effect of tactile touch on changes in vital signs (body temperature p-value 0.036, heart rate p-value 0.006 and oxygen saturation p-value 0.000) in BBLR in the NICU Room of dr. M.M.Dunda Limboto.

## ADVICE

Hospitals are expected to implement tactile touch interventions as part of supportive care to help stabilize the physiological parameters of newborns, namely vital signs consisting of body temperature, heart rate and oxygen saturation.

Nurses can apply tactile touches that affect the changes in the vital signs of BBLR patients into the nursing care intervention of BBLR patients in a sustainable manner so as to improve nursing services.

Researchers can then develop research variables related to the provision of tactile touch in influencing the vital signs of BBLR patients such as gender.

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