THE EFFECT OF INFANT MASSAGE ON REDUCING BILIRUBIN LEVELS IN INFANTS WHO GET FORMULA MILK IN HOSPITALS WEST JAVA REGION YEAR 2024

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ABSTRACT

Indirect hyperbilirubinemia is one of the conditions that most affect the health of newborns worldwide and occurs in 60% of full-term and 80% of preterm newborns. Infant massage can be an effective method of managing icteric infants. This study aims to determine the effect of infant massage on reducing bilirubin levels in formula-fed infants in hospitals in West Java region in 2024. The design used was pre-test and post-test with control group (quasy experiment with control). The population in this study were icteric infants hospitalized in the West Java region in June 2024 as many as 34 infants with a total sample of 92 infants. The sampling technique used a total sampling approach. Data analysis using paired t test and independent t test. The bilirubin level of infants who received formula milk before being given baby massage was found to have an average of 16.4588mg/dl and afterward 10.2353mg/dl, resulting in an average difference in bilirubin level reduction of 6.2235mg/dl. Bilirubin levels of infants who received formula milk before the control group obtained an average of 18.8941mg/dl and after 12.8412mg/dl so that the average difference in bilirubin levels decreased by 6.0529mg/dl. There is a decrease in bilirubin levels before and after baby massage in jaundice babies (p-Value 0.000). There is a decrease in bilirubin levels before and after in the control group of jaundice babies (p-Value 0.000). There is an effect of infant massage on reducing bilirubin levels in infants who get formula milk (p-Value 0.032). Infant massage can reduce bilirubin levels in neonatal hyperbilirubinemia and can be recommended to be given in careful care. Infant massage may be effective for the prevention of pathological jaundice in healthy newborns.

Keywords: Infant Massage, Bilirubin Level, Formula Milk Infants

INTRODUCTION

Indirect hyperbilirubinemia is one of the conditions that most affect the health of newborns worldwide and occurs in 60% of full-term and 80% of preterm newborns (Doğan et al., 2023). Hyperbilirubinemia develops physiologically, mostly occurring in the first week of life. Hyperbilirubinemia, also referred to as jaundice, is a common and frequent condition in newborns, but is the leading cause of hospitalization in the first week of life. In some infants, jaundice can be severe, progressing to acute bilirubin encephalopathy and kernicterus with a substantial risk of neonatal mortality and long-term neurodevelopmental impairment (Olusanya et al., 2019). Jaundice (Neonatal Icterus) is a usually harmless newborn disease that causes yellowing of the skin and whites of the eyes. This disorder is reported to occur in more than half of newborns and 80% of premature children. There are several risk factors, but the main ones are premature birth, mother-infant blood group differences, infants of East Asian descent, and breastfeeding. Neonatal jaundice can lead to acute bilirubin encephalopathy and kernicterus in severe cases (Shahbazi et al., 2022)

Neonatal hyperbilirubinemia refers to excess bilirubin of more than 5 mg/dl above normal levels (Eghbalian et al., 2019). Another opinion says neonatal hyperbilirubinemia is defined as excess bilirubin of more than 13 mg/dl. Jaundice is caused by the deposition of bilirubin in the skin and mucosa. Unconjugated (indirect) hyperbilirubinemia is usually harmless, but can cause kernicterus in severe cases. Jaundice can occur at birth or at any time during infancy (Zhang et al., 2019). The

diagnosis and treatment of neonatal hyperbilirubinemia is crucial in the prevention of encephalopathy. Elevated bilirubin occurs in infants between 3 and 7 days of age (Eghbalian et al., 2019). One type of jaundice is physiological jaundice where this disease is categorized as harmless, but if bilirubin levels are very excessive or can lead to pathological then it must be treated quickly. Elevated blood bilirubin levels in infants are caused by unconjugated bilirubin which is because the liver in infants is unable to clear bilirubin in the blood quickly. Lack of calorie and fluid intake, weight loss or delayed bowel movements cause the baby's risk of jaundice. Treatment includes phototherapy, exchange transfusion and infant massage to prevent encephalopathy or kern icterus (Krisnanto et al., 2019).

Based on the 2018 Basic Health Research (Riskesdas) data on causes of neonatal mortality, hematological disorders / hyperbilirubinemia is the number 5 cause of neonatal morbidity with a prevalence of 5.6% after respiratory distress, prematurity, sepsis, and hypothermia. There is no multicenter data on hyperbilirubinemia in Indonesia. The latest data on the prevalence of severe hyperbilirubinemia (>20mg/dL) is 7%, with acute encephalopathic hyperbilirubinemia at 2%. Statistically, the incidence of infants with hyperbilirubin found in newborns within the first week of life in Indonesia was 51.47% with comparisons in America 65% and Malaysia 75% (WHO, 2019). According to the 2018 Riskesdas, there are several factors that cause hyperbilirubin, including asphyxia 51%, LBW 42.9%, Prematurity 33.3%, congenital abnormalities 2.8% and due to sepsis 12% (Kemenkes RI, 2019).

Hyperbilirubinemia is one of the most common causes of infant mortality caused by emergencies and complications in neonates. Based on data at Drajat Prawiranegara Hospital, Serang Regency, Banten Province in 2019, hyperbilirubin cases were the highest cases, namely 757 babies out of a total of 2764 babies admitted to the perinatology room (Khotimah & Subagio, 2021).
Handling hyperbilirubinemia in infants uses several standard therapies, namely phototherapy, exchange transfusion or a combination of photo therapy and exchange transfusion. Standard therapy used will be more effective if supported by good physical conditions in infants. Good nutritional intake, sleep quality, good elimination from the digestive tract and urinary tract will affect the baby's physical condition. The comfort obtained by the baby during the massage process greatly affects the serotonin levels in the baby, and indirectly affects the function of the digestive tract. Improved digestive tract function will increase nutrient intake and elimination from the digestive and urinary tracts. Improved gastrointestinal function as evidenced by increased nutrient intake will help the bilirubin conjugation process, while increased defecation and urine elimination will help remove conjugated bilirubin. Infant massage will indirectly reduce newborn serum bilirubin levels (Kristian & Purnamiasih, 2023).

There are several widely used interventions to prevent severe hyperbilirubinemia, either by reducing enterohepatic bilirubin or inhibiting its production. Infant massage has been shown to be an effective method. In many regions of the world, massaging infants is a common practice. There have been many studies on the effects of infant massage over the past decades which have shown many benefits such as weight and length gain, increased bone mineral density, better sleep, elimination and reduction of colic, also associated with reduced infant stress, better physiological and behavioral responses, reduced hospital stay and provides an intervention that allows parents to take an active role (Mardianti et al., 2022). Based on several clinical investigations, massage improves defecation and thus bilirubin excretion, which may reduce jaundice in newborns (Dalili et al., 2019). Therefore, we conducted a study to examine the effect of infant massage on reducing bilirubin levels in jaundiced infants in Banten and West Java provinces.

METHOD

This type of research is quantitative with a quasi experiment design that aims to determine the effect of baby massage on reducing bilirubin in jaundiced babies. The design used was pre-test and posttest with control group (quasy experiment with control). This research was conducted in June-July 2024 in hospitals in the West Java Province. The population in this study were infants who received formula milk in hospitals in the West Java region in June 2024 as many as 34 infants. The sampling technique in this study was carried out using total sampling on the grounds that the number of samples was less than 100. However, sampling was determined by the researcher with inclusion and exclusion criteria. the sample used was 34 respondents. The data used in this study are primary data, namely data obtained from respondents directly based on the observation of bilirubin levels. The variables in this study consisted of independent and dependent variables. The independent variable in this study is baby massage. The dependent variable in this study is the decrease in bilirubin levels. Hypothesis testing in this study is determined based on the results of the data normality test, based on the results of the data normality test, it will be determined what test tool is most suitable for use. If the data is normally distributed, the parametric T-Test Independent test is used, while for data that is not normally distributed the calculation uses a non-parametric test, namely the Mann Whitney test. This study uses a significant level of 5% if the p value <0.05 then the Ha hypothesis is accepted, and vice versa if the p value> 0.05 then the Ha hypothesis is rejected.

RESULT AND DISCUSSION

Table 1.
Characteristics of Respondents by gender (n=34)

Gender	Group			
	Intervention		Control	
	f	%	f	%
Male	10	58,8	9	52,9
Woman	7	41,2	8	47,1
Total	17	100,0	17	100,0

Based on the results of the study in table 5.1, it is known that of the 17 infants who received formula milk in the intervention group, most were male as many as 10 respondents (58.8%), and in the control group most were male as many as 9 respondents (52.9%).

Table 2.
Characteristics of respondents by age (n=34)

Age	N	Mean	Min	Max
Intervention	17	2	2	4
Control	17	3	2	4

Based on the results of the study in table 5.2, it is known that of the 17 infants who received formula milk in the intervention group with an average age of 2 days and than the control group with an average age of 3 days.

Table 3.
Decrease in Bilirubin Levels Before and After Infant Massage in Infants Receiving Formula Milk at Hospitals in West Java Province in 2024

Infant Massage Intervention	*Mean*	Mean Difference	*P Value*
Before	16,4588	6,2235	0,000
After	10,2353		

The results of the paired t-test test showed that the significance value before and after baby massage was obtained p value of 0.000 <0.05, it can be concluded that Ho is rejected and Ha is accepted, thus it can be concluded that there is a decrease in bilirubin levels before and after baby massage in infants who get formula milk in hospitals in West Java region in 2024.

Table 4.
Decrease in Bilirubin Levels Before and After in the Control Group of Infants Receiving Formula Milk in Hospitals in the West Java Region in 2024

Infant Massage Intervention	*Mean*	Mean Difference	*P Value*
Before	18,8941	6,0529	0,000
After	12,8412		

The results of the paired t-test showed that the significance value before and after in the control group obtained a p-value of 0.000 < 0.05, so it can be concluded that Ho is rejected and Ha is accepted. Thus, it can be concluded that there was a decrease in bilirubin levels before and after in the control group of infants who received formula milk at hospitals in the Banten and West Java regions in 2024.

Table 5.
The Effect of Infant Massage on Reducing Bilirubin Levels in Jaundiced Infants in Hospitals in Banten and West Java in 2024

Infant Massage Intervention	*Mean*	Mean Difference	*P Value*
Intervention Group	10,2353	2.6059	0,032
Control Group	12,8412		

The results of the independent t-test showed that the significance value after treatment in the intervention group and control group was 0.032 < 0.05, so it can be concluded that Ho is rejected and Ha is accepted. Thus, it can be concluded that there is an effect of infant massage on reducing bilirubin levels in infants who receive formula milk at hospitals in Banten and West Java in 2024.

Based on the results of the study, it was found that of the 17 infants who received formula milk in the intervention group, the majority were male, with 10 respondents (58.8%), and in the control group, the majority were male, with 9 respondents (52.9%). Researchers assume that the high number of male infants in this study is due to mothers' concerns that their breast milk supply is insufficient, leading them to choose to supplement their male infants' diets with formula milk. Despite being breastfed, the infants remained fussy, prompting the mothers to take the initiative to give them formula milk. Looking at the results of bilirubin levels, it was found that male infants were more likely to experience hyperbilirubinemia than female infants, due to genetic

abnormalities in the bilirubin binding process and enzyme abnormalities. This genetic abnormality is caused by the fact that male babies have a Y chromosome, which can lead to an increase in the rate of bilirubin metabolism and a delay in the maturation of enzymes that assist in bilirubin metabolism, resulting in elevated bilirubin levels in the body. Low levels of progesterone in male infants cause a delay in the bilirubin metabolism process, which affects the high bilirubin levels in male infants.

Based on the results of the study, it was found that 17 infants received formula milk in the intervention group with an average age of 2.29 days and in the control group with an average age of 2.88 days. Researchers assume that the high number of infants found with hyperbilirubinemia, with an average age between two and three days, is due to fluid deficiency at that age, which causes bilirubin to accumulate in the infant's blood. A lack of fluid intake in the infant's body can cause bilirubin levels in the blood to increase. Additionally, the liver function in infants is not yet fully developed, as the liver is not yet mature, leading to hyperbilirubinemia in infants.

Based on the results of the study, it can be seen that the average bilirubin level in infants who received formula milk before the intervention was 16.4588 mg/dl, and after the intervention, the average bilirubin level was 10.2353 mg/dl, resulting in an average decrease in bilirubin levels of 6.2235 mg/dl. Researchers assume that there is a decrease in bilirubin levels in jaundiced babies who receive infant massage. This is because infant massage stimulates the digestive nerves, namely the vagus nerve, thereby increasing stomach movement and accelerating stomach emptying. This condition makes babies feel hungry more easily, resulting in more frequent breastfeeding. Frequent breastfeeding reduces bilirubin levels because it is excreted through urine and bowel movements. This results in a rapid decrease in bilirubin levels.

Based on the results of the study, it can be seen that the bilirubin levels of infants who received formula milk before the control group had an average bilirubin level of 18.8941 mg/dl, and after the control group had an average bilirubin level of 12.8412 mg/dl, resulting in an average decrease in bilirubin levels of 6.0529 mg/dl. Based on research findings on the occurrence of hyperbilirubinemia in infants fed formula milk, this is attributed to the higher content of caffeine-containing proteins in cow's milk, which are more difficult for an infant's intestines to digest. In contrast, breast milk contains more whey proteins, which are easier for an infant's intestines to digest and absorb. As a result, infants fed formula milk are more likely to experience hyperbilirubinemia compared to those exclusively breastfed. Several factors contribute to infants being given formula milk in hospitals in West Java. This is because mothers undergo cesarean sections, which cause discomfort when breastfeeding. This condition leads mothers to prefer formula milk over breast milk. Another factor is the absence of rooming-in, so formula milk is given first before breastfeeding. A lack of information about proper breastfeeding techniques can cause the mother's nipples to become sore, making her reluctant to breastfeed her baby. Additionally, flat or inverted nipples may lead mothers to choose formula over breastfeeding. The decrease in bilirubin levels in the control group babies was due to the fact that when it was discovered that the babies had elevated bilirubin levels, they were immediately given phototherapy and healthcare workers advised the mothers to breastfeed as often as possible. However, since massage was not performed on the babies, the decrease in bilirubin levels was not as significant compared to babies who received massage.

The results of the independent t-test showed that the significance value after treatment in the intervention group and control group was $0.032 < 0.05$, so it can be concluded that Ho is rejected and Ha is accepted. Thus, it can be concluded that there is an effect of infant massage on reducing

bilirubin levels in infants who receive formula milk in hospitals in the West Java region in 2024. Researchers assume that infant massage has an effect on reducing bilirubin levels in infants who are fed formula milk. This is because massage stimulates the digestive nerves, which in turn stimulates the digestive tract, increasing stomach movement and emptying the stomach more quickly. Faster gastric emptying can make infants feel hungry sooner, leading to more frequent feedings, which in turn results in more frequent bowel movements. This process causes bilirubin levels to decrease as it is processed through the digestive tract and subsequently excreted via urine and bowel movements. An increase in breastfeeding, bowel movements, and urination can lead to a faster decrease in bilirubin levels. Based on these results, it is advisable to perform regular massage on newborn babies for about 15 minutes a day as one of the efforts to stimulate the baby's digestive tract, thereby increasing nutrient intake, which will ultimately lead to a decrease in bilirubin levels and promote optimal baby health by stimulating growth and development.

CONCLUSION

There is an effect of infant massage on the reduction of bilirubin levels in infants receiving formula milk at West Java Regional Hospital in 2024 with a p-value of 0.032.

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