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Implementation of Lying Turning During Phototherapy to Reduce Bilirubin Levels in Hyperbilirubinemia Babies

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Abstract

Neonatal jaundice is a condition that often occurs in newborn babies. Hyperbilirubin occurs due to high levels of bilirubin in the blood which is marked yellow on the sclera and skin. Bilirubin levels that are too high can cause kernicterus if not treated immediately. To reduce bilirubin levels, phototherapy is indicated. The benefit of applying bed transfer therapy is as a way to reduce bilirubin levels evenly in neonates when phototherapy is carried out. According to the United Nations Children's Fund (UNICEF), there are 1.8% of infant deaths caused by hyperbilirubin in all perinatal cases that occur in the world. The incidence of infant hyperbilirubinemia in Indonesia is around 50% of term babies whose skin, mucosa, and facial changes become yellowish (jaundice). In preterm babies, the incidence reaches 75%. Implement bed shifting during phototherapy to determine the effectiveness of reducing bilirubin levels in hyperbilirubinemia patients. This research is an analytical descriptive research with a case study approach. The subjects of this study were 2 hyperbilirubin patients aged 18 days and 6 days. his research was conducted in June 2024 at the Hospital. Data was obtained through interviews, observation, physical examination and laboratory results of bilirubin levels. Data is presented in the form of narrative text and research instrument sheet tables. This research has gone through an ethical feasibility test. The results of the case study research using bed shifting during phototherapy resulted in a reduction in bilirubin levels in both subjects. The results of the decrease in the first patient were total bilirubin 13.36 mg/dl, direct bilirubin 0.69 mgdl, indirect bilirubin 12.67 mg/dl, the second patient total bilirubin 9.60 mg/dl, direct bilirubin 1.09 mg/dl, Indirect bilirubin 8.51 after being given bed rest during phototherapy for 2 days, the first patient had total bilirubin 10.06 mg/dl, direct bilirubin 0.37 mg/dl, indirect bilirubin 9.67 mg/dl, second patient total bilirubin 8.89 mg/dl, bilirubin direct 0.18 mg/dl, indirect bilirubin 8.71mg/dl. Patients with hyperbilirubinemia are advised to provide adequate breast milk intake and expose themselves to sunlight in the morning between 07.00 – 09.00 for 15 minutes.

Keywords: bed transfer, bilirubin levels, neonatal jaundice, phototherapy

Introduction

IMR (Infant Mortality Rate) refers to the number of babies who die in the phase between birth until the baby has not reached 1 year of age per 1,000 live births. The main problem causing death in infants and toddlers is the neonatal period (newborn babies aged 0-28 days). Most newborn babies experience jaundice in the first week of life.1 According to the World Health Organization (WHO) in Maria (2017) explained that in 2014 the infant mortality rate (IMR) in the world was still quite high, namely 34 babies were estimated to die out of 100,000 births. The percentage of jaundice that occurs is 3% (3.6 million) out of 120 million births, and of these 3.6 million jaundice incidents, 1 million babies die.2 According to the United Nations Children's Fund (UNICEF), there are 1.8% of infant deaths caused by hyperbilirubin from all perinatal cases that occur in the world.3

Based on Indonesia's health profile in 2016, the results of the 2017 National Socio-Economic Survey (SUSENAS) showed that the Infant Mortality Rate (IMR) was 22.73 per 1000 live births, which means that it has reached the 2015 MDGs target of 23 per 1000 live births. Based on the 2017 Demographic Survey (SDKI), IMR has decreased to 24 per 1000 live births. In Indonesia, of all births, 575 died as newborns (under 1 month of age). This shows that there has been a decrease in the incidence of hyperbilirubinemia in babies in Indonesia. The incidence of infant hyperbilirubinemia in Indonesia is around 50% of full-term babies whose skin, mucosa and facial changes become yellowish (jaundice). In pre-term babies the incidence reaches 75%.4

In the Health Profile of Central Java Province, 2015, the Infant Mortality Rate is still high at 10 per 1000 live births. There was a decrease but it was not significant compared

to the IMR in 2014, namely 10.08 per 1000 live births. The causes of infant death in Central Java in 2015 were respiratory disorders 37%, prematurity 34%, sepsis 12%, hypothermia 7%, jaundice 6%, post-maturity 3%, congenital abnormalities 1%.5

The results of a preliminary study of bilirubin cases that underwent phototherapy were carried out in June 2024, there is data from 2021 of 82 cases, in 2022 there were 85 cases and in 2023 there were 99 cases. These results show that cases of bilirubin at RSI PKU Muhammadiyah increase every year.

Hyperbilirubinemia or neonatal jaundice is a condition that often occurs in newborns, especially in babies with low body weight (less than 2,500 grams). Hyperbilirubinemia occurs due to high levels of bilirubin in the blood which is characterized by a yellow color on the sclera and skin. Bilirubin is the result of the breakdown of hemoglobin due to damaged red blood cells. Hyperbilirubin can occur physiologically and pathologically. Physiologically, babies experiencing jaundice on the face and neck, or in degrees one and two (12mg/dl), can be overcome by providing adequate breast milk intake and morning sunlight between 07.00 – 09.00 for 15 minutes. Pathologically the baby will experience jaundice all over the body or grade three to 5 (>12mg/dl), which is indicated for phototherapy. If the bilirubin level is >20mg/dl, then the baby will be indicated for exchange transfusion.4

Phototherapy is the main therapy for hyperbilirubinemia without causing or with minimal side effects, but you must remain alert to undesirable effects. The length of time required for phototherapy also affects the quality of the baby's health care. The effectiveness and efficiency of phototherapy depends on the surface area exposed to phototherapy, the wavelength and intensity of the light provided.6

According to Kosim 2010, phototherapy is the main choice for treating

hyperbilirubinemia in babies. The aim is to reduce abnormal blood bilirubin levels and reduce jaundice in the baby's body. For maximum results, the baby's entire body should be exposed to light (irradiance) by lying down, namely Change positions on the right side, left side, supine and prone every 3 hours during phototherapy. This bed transfer aims to increase the process of evenly distributing light to levels of bilirubin that is not soluble in water (indirect) into bilirubin that is soluble in water (direct), so that it can be excreted through urine.7

According to Widagdo 2012, the role of nurses as providers of nursing care, especially for babies with hyperbilirubinemia, is to provide nursing actions, namely preventive, promotive, curative and rehabilitative. Health workers are required to have the knowledge and skills to be able to provide optimal care for babies by providing optimal positions during phototherapy and monitoring bilirubin levels so that the toxic impact of hyperbilirubinemia can be avoided .8

Based on research conducted by Shinta (2015), of the 40 respondents who underwent intervention in the right tilt, left tilt, supine and prone positions with the lowest bilirubin levels of 12.28 mg/dl and the highest bilirubin of 21.45 mg/dl, while 20 respondents who The supine position was carried out as a control group with the lowest bilirubin level of 12.57 mg/dl and the highest bilirubin value of 20.54 mg/dl. It was found that in the intervention group the average bilirubin level after phototherapy was 44.74 hours with a change in position on the right side, sideways left, supine and prone is 7.93 mg/dl. The average length of time babies underwent phototherapy in the control group was 64.04 hours while in the intervention group it was 44.74 hours, this shows that hyperbilirubinemia babies in the control group had longer phototherapy times than hyperbilirubinemia babies in the intervention group, so it was concluded that Changing

position or changing lying down has an effect on reducing bilirubin levels in hyperbilirubinemic babies undergoing phototherapy9. Based on research conducted by Wikanthiningtyas (2016), there were 25 neonates who experienced neonatal jaundice. It was found that the bilirubin level before phototherapy was 18.39 mg/dl, while the average bilirubin level after phototherapy for 24 hours was carried out by lying down on one side. right, left side, supine and prone, namely 15.22 mg/dl. So it was concluded that there was an effect of bed transfer during phototherapy on reducing bilirubin levels in neonatal jaundice in the Neonatal HCU Room at Dr. RSUD. Moewadi10. Another study conducted by Mulyati, Iswati and Wirasti (2019) found 3 neonates who experienced hyperbilirubinemia. The nursing action given was bed transfer (changing positions on the right side, left side and prone) every 3 hours during 18 hours of phototherapy, each patient had an average decrease in total bilirubin levels of 9.55 mg/dl, direct bilirubin 0.15 mg/dl and indirect bilirubin 9.40 mg/dl. So it can be concluded that the three neonates experienced a decrease in bilirubin levels in the Melati Room at Prof. Hospital. Dr. Margono Soekarjo Purwokerto.8

Based on the phenomena that have been mentioned, researchers are interested in conducting research entitled "Implementation of Lying Transfer During Phototherapy to Reduce Bilirubin Levels in Hyperbilirubinemic Babies".

Method

The method must be arranged as follows:

1. Research Design

   The research design is a case study. A case study is research conducted on a case with a detailed, sharp, and in-depth process.

2. Setup and Sample

   The research subjects were 2 infant patients with moderate hyperbilirubinemia who underwent phototherapy intervention with bed rest to reduce bilirubin levels with

the following criteria.:

1) Inculcation Criteria

a.Hyperbilirubinemia babies undergoing phototherapy

b.Guardians/Parents are willing to be research subjects.

2) Exclusion Criteria

The exclusion criteria in this study were babies who had complications of neonatal jaundice.

3. Measurement and Data Collection

The research instruments used were an observation sheet for lying down during phototherapy and an observation sheet for monitoring bilirubin levels after phototherapy. The research was carried out by implementing bed shifting during phototherapy every hour in shifts for 2 days.

4. Data Analysis

Data analysis is carried out since research in the field, when data is collected until all data is collected. The implementation of data analysis is carried out by presenting facts, then comparing them with existing theories and pouring them into discussion opinions. The sequence in data analysis includes data collection, data reduction, data copying, and conclusions.

Results

Table 1
Observation Sheet For Lying Down During Phototherapy (Day 1)

Patient 1			Patient 2		
Day, Date	Time	Position change indicator	Day, Date	Time	Position change indicator
Thursday, June 6, 2024	8.00 a.m	Right Tilt	Friday, June 27, 2024	7.00 am	Right Tilt
	9.00 a.m	Leaning Left		8.00 a.m	Leaning Left
	10.00 a.m	Prone		9.00 a.m	Prone
	10.30 a.m	Supine		9.20 a.m	Supine
	12.30 a.m	Right Tilt		11.20 a.m	Right Tilt
	1.30 p.m	Leaning Left		12.20 p.m	Leaning Left
	2.30 p.m	Prone		1.20 p.m	Prone
	3.00 p.m	Supine		1.40 p.m	Supine

Table 2
Observation Sheet For Lying Down During Phototherapy (Day 2)

Patient 1			Patient 2		
Day, Date	Time	Position change indicator	Day, Date	Time	Position change indicator
Friday, June 7, 2024	7.45 a.m	Right Tilt	Saturday, June 8, 2024	7.30 am	Right Tilt
	8.45 a.m	Leaning Left		8.30 a.m	Leaning Left
	9.45 a.m	Prone		9.30 a.m	Prone
	10.15 a.m	Supine		9.50 a.m	Supine
	12.15 a.m	Right Tilt			
	1.15 p.m	Leaning Left			
	2.15 p.m	Prone			
	2.45 p.m	Supine			

Phototherapy for Patient 1 starts on June 5 2024 at 5.00 p.m until June 7 2024 at 5.00 p.m

Phototherapy for Patient 2 starts on June 7 2024 at 00.30 a.m. until June 8 2024 at 12 a.m. .

Table 3
Bilirubin Level Monitoring Observation Sheet
Patient 1 By. N
The results of the examination before phototherapy were carried out on June 5 2024
The results of the examination after phototherapy were carried out on June 11 2024

Inspection	Results Before phototherapy	Results After Phototherapy	Normal Value
Total Bilirubin	13.36 mg/dl	10.06 mg/dl	0 – 1
Direct Bilirubin	0.69 mg/dl	0.37 mg/dl	0 – 0.25
Indirect Bilirubin	12.67 mg/dl	9.69 mg/dl	0 – 0.60

Table 4
Bilirubin Level Monitoring Observation Sheet
Patient 2 By. Mrs. F
The results of the examination before phototherapy were carried out on June 16 2024
The results of the examination after phototherapy were carried out on June 13 2024

Inspection	Results Before phototherapy	Results After Phototherapy	Normal Value
Total Bilirubin	9.60 mg/dl	8.89 mg/dl	0 – 1
Direct Bilirubin	1.09 mg/dl	0.18 mg/dl	0 – 0.25
Indirect Bilirubin	8.51 mg/dl	8.71 mg/dl	0 – 0.60

Discussion

The discussion should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

The results of the assessment of patient 1 which was carried out for 2 days in the Perinatology Room showed that the baby had jaundice in the sclera and skin with an increase in total bilirubin levels of 13.36 mg/dl, direct bilirubin 0.69 and indirect

bilirubin 12.67 mg/dl. The assessment of patient 2, which was also carried out for 2 days in the Perinatology Room, showed that the 6 day old baby had yellowness of the sclera and skin with an increase in total bilirubin levels of 9.60 mg/dl, direct bilirubin of 1.09 mg/dl and indirect bilirubin of 8.51 mg/dl based on these data shows that the hyperbilirubinemia that occurs in these babies is physiological jaundice.

In patient 1 yellow skin appeared on the 15th day with the etiology of inadequate breast milk accompanied by a comorbidity, namely bronchopneumonia, while in patient 2 yellow skin appeared on the 4th day with the etiology of premature birth, namely birth at 34 weeks of age with a BBL of 1250 grams. and inadequate breast milk. Based on this, patient 2 experienced the most increase in bilirubin due to weak organs and immature liver function.

There were differences in the results of the studies obtained, namely the level of phototherapy given to each baby. By. N received phototherapy therapy for 48 hours, By Mrs F received phototherapy therapy for 24 hours. The duration of phototherapy is determined based on the neonate's bilirubin levels and the phototherapy time is carried out for 24 hours for changes in bilirubin levels and is repeated until the bilirubin levels return to normal.7 The provision of phototherapy can be combined with the implementation of nursing in the form of bed transfer to optimize the reduction in bilirubin levels in the blood. Lying down or changing position is the act of changing the position of a patient undergoing phototherapy to help the process of breaking down bilirubin in the liver. Changing lying down or changing the patient's position is carried out by tilting to the right, tilting to the left, prone and supine. Changing lying down or changing position aims to increase the process of conjugating indirect bilirubin into water-soluble (direct) bilirubin, so that it can be excreted in the urine.

The results of the study in this case, after being given bed rest during phototherapy, resulted in a decrease in the patient's bilirubin levels, namely in case 1 from total bilirubin 13.36 mg/dl, direct bilirubin 0.69 and indirect bilirubin 12.67 mg/dl to total bilirubin 10.06 mg/dl, direct bilirubin 0.37 mg/dl and indirect bilirubin 9.67 mg/dl, case 2 of total bilirubin 9.60 mg/dl and direct bilirubin 1.09 mg/dl and indirect bilirubin 8.51 mg /dl to total bilirubin 8.89 mg/dl, direct bilirubin 0.18 mg/dl and indirect bilirubin 8.71 mg/dl. This is in accordance with previous research (Mulyati, 2019). Changing lying down (changing the right side, left side and prone) every 3 hours

during phototherapy is an easy way to reduce bilirubin levels.

This is supported by research conducted by Shinta (2015) where of the 40 respondents there were 20 respondents underwent intervention in the right tilt, left tilt and prone positions with the lowest bilirubin levels of 12.28 mg/dl and the highest bilirubin of 21.45 mg/dl , while the 20 respondents who were placed in the supine position as the control group had the lowest bilirubin level of 12.57 mg/dl and the highest bilirubin value of 20.45 mg/dl. It was found that in the intervention group, the average bilirubin level after phototherapy was 44.74 hours with changes right side, left side, supine and prone position is 7.93 mg/dl. The average length of time babies underwent phototherapy in the control group was 66.04 hours while in the intervention group it was 44.74 hours, this shows that hyperbilirubinemia babies in the control group had longer phototherapy and treatment times than hyperbilirubinemia babies in the intervention group. So it was concluded that changes in position affected reducing bilirubin levels in neonates undergoing phototherapy.9

In this study, there was no control group and intervention group, but there was a decrease in bilirubin values in the two patients. This is supported by research by Wikanthiningtyas (2016) of 25 neonates who experienced neonatal jaundice, it was found that the bilirubin level before phototherapy was 18.39 mg/dl, while the average bilirubin level after phototherapy for 24 hours was carried out by lying down (changing the position on the right side), left side, and prone) namely 15.22 mg/dl. The average decrease before and after phototherapy was 3.17 mg/dl with a significant value of 0.00 ($p<0.05$), meaning that there was an effect of changing to bed during phototherapy on the value of bilirubin levels in neonates experiencing jaundice. In research according to Dewi (2016), data was obtained that 44 neonates underwent phototherapy without being transferred to bed, namely with an average bilirubin level before phototherapy of 15.30 mg/dl and after 24 hour phototherapy of 12.80 mg/dl. Decrease in bilirubin levels of 2.50 mg/dl in 24 hours.10

Researchers assume that this research is the same as previous research in which changing beds during the phototherapy process is useful for reducing bilirubin levels in hyperbilirubinemic babies with the frequency during phototherapy therapy carried out according to doctor's instructions being more effective than phototherapy carried out. without lying down.

The intervention that the researchers took to reduce bilirubin levels was by implementing a bed shift or changing the patient's position during phototherapy in the Perinatology Room at RSI PKU Muhammadiyah Tegal. The instruments used to monitor bilirubin levels and bed transfer observations use observation sheets, bed transfer observations are carried out when therapy is carried out and monitoring of bilirubin levels is carried out when phototherapy therapy is completed.

From the results of the research, it was found that patient 1 on the first day before implementing the bed transfer, the researcher explained the procedures for carrying out the research as well as the SOP for providing therapy, carried out for 2 days by changing the patient's position from right side, left side, prone and supine during phototherapy. Phototherapy therapy was given to By N on 5-7 June 2024 at the age of 18 days, female, resulting in a Kramer III degree in the assessment of neonatal jaundice. On the second day, the patient's skin changed or decreased in yellow and the baby's movements were active, sucking breast milk hard and crying strongly.

In Patient 2 Mrs. F received instructions from the doctor to carry out phototherapy for 1 x 24 hours, the researchers carried out the implementation of bed transfer carried out on 7-8 June 2024 with the age of 6 days, female, the results were obtained on the first day with a Kramer III grade assessment, namely yellow on the head, neck, chest and above the umbilical cord. On the second day, the patient experienced a decrease in the yellow color of the patient body, namely at Kramer II degree, with yellow color on the head, neck, and chest, the patient's movements were active, muscle tone was good, the sucking reflex was strong, and the baby cried strongly.

Conclusion

Based on research conducted at Perinatology Room at RSI PKU Muhammadiyah Tegal, the following conclusions were obtained:

1. The act of changing the bed during the phototherapy process is useful for reducing bilirubin levels. Changing positions on your back, right side, left side and stomach can increase the process of evenly distributing phototherapy light exposure, thereby accelerating the reduction in bilirubin levels.
2. Implementation of bed transfer during phototherapy in both patients was carried out 2 x 24 hours in 1 day 7 hours/per shift for 1-2 hours changing positions.

3. The results of the bed transfer intervention during phototherapy showed changes in bilirubin levels in both patients, indicated by the result that the yellow color of the skin decreased in patient By. N with total bilirubin 10.06 mg/dl, direct bilirubin 0.37 mg/dl and indirect bilirubin 9.67 mg/dl. Patient By Mrs. F with the results of a decrease in total bilirubin of 8.89 mg/dl, direct bilirubin of 0.18 mg/dl and indirect bilirubin of 8.71 mg/dl, the yellow color of the patient's skin was reduced, the baby's movements began to be active, muscle tone was good, and crying was strong.

Ethical Considerations

This research has received ethical approval from Bhamada Slawi University (Letter No.033/Univ.Bhamada/KEP.EC/VI/2024).

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Confession

This research uses personal funds by researchers for publication.

Conflict of Interest

There is no conflict of interest in conducting this research.

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