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Field Massage as a Complementary Therapy to Phototherapy in Neonates with Hyperbilirubinemia

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ABSTRACT

Hyperbilirubinemia is a common neonatal condition requiring prompt treatment to prevent complications. While phototherapy is the standard approach, it has limitations and potential side effects, such as diarrhea, dehydration, skin rashes, retinal damage, hyperthermia, extended hospital stays, maternal-infant separation, and disruptions in breastfeeding. This study aimed to evaluate the effectiveness of Field massage as a complementary therapy to phototherapy in reducing serum bilirubin levels in neonates. Field massage is a gentle manipulation technique performed on the face, chest, abdomen, limbs, and neck to stimulate the vagus nerve and enhance metabolic processes, which is believed to help lower serum bilirubin levels and has shown no negative side effects. This research method used a quasi-experimental study conducted at Abdoel Wahab Sjahranie Hospital from March to June 2024 involving 20 neonates divided into two groups: a treatment group that received Field massage and phototherapy (n = 10) and a control group that only received phototherapy (n = 10). Field massage was administered twice daily at 07:00 and 16:00 for 15–20 minutes, at least one hour after feeding. Statistical analysis was conducted using the Paired T-Test to assess changes in bilirubin levels before and after treatment, while the Independent T-Test was used to compare outcomes between the treatment and control groups. The results of the study showed serum bilirubin levels decreased significantly in both groups, with a more significant reduction observed in the treatment group (15.28 ± 3.01 mg/dL to 7.09 ± 1.60 mg/dL, p = 0.000) compared to the control group (15.94 ± 2.88 mg/dL to 8.63 ± 1.57 mg/dL, p = 0.000). Post-intervention analysis confirmed the superior efficacy of the combined therapy (p = 0.043). These results suggest that combining field massage with phototherapy is more effective in reducing bilirubin levels than phototherapy alone. It was concluded that Field massage enhances phototherapy's effectiveness in managing neonatal hyperbilirubinemia. Future research should include larger samples and explore additional therapies to reduce bilirubin. Examining phototherapy duration, hospital length of stay, and bowel movement frequency could provide deeper insights.

Keywords: Field Massage, Hyperbilirubinemia, Neonates, Phototherapy, Complementary Therapy.

ABSTRAK

Hiperbilirubinemia adalah kondisi neonatal umum yang memerlukan penanganan cepat untuk mencegah komplikasi. Fototerapi adalah terapi standar, namun memiliki keterbatasan dan efek samping, seperti diare, dehidrasi, ruam kulit, kerusakan retina, hipertermia, perawatan di rumah sakit yang lama, pemisahan ibu dan bayi, dan gangguan dalam menyusui. Penelitian ini bertujuan untuk mengevaluasi efektivitas pijat Field sebagai terapi tambahan terhadap fototerapi dalam menurunkan kadar bilirubin serum pada neonatus. Pijat Field adalah teknik manipulasi lembut yang dilakukan pada wajah, dada, perut, anggota badan, dan leher untuk merangsang saraf vagus dan meningkatkan proses metabolisme, yang diyakini membantu menurunkan kadar bilirubin serum dan tidak menunjukkan efek samping negatif. Metode penelitian ini menggunakan studi kuasi-eksperimental ini dilakukan di RS Abdoel Wahab Sjahranie dari Maret hingga Juni 2024 dengan melibatkan 20 neonatus yang dibagi menjadi dua kelompok: kelompok perlakuan yang menerima pijat Field dan fototerapi (n=10) serta kelompok kontrol yang hanya menerima fototerapi (n=10). Pijat Field diberikan dua kali sehari pada pukul 07.00 dan 16.00 selama 15–20 menit, setidaknya satu jam setelah menyusui. Analisis statistik dilakukan dengan

menggunakan *Paired T-Test* untuk menilai perubahan kadar bilirubin sebelum dan sesudah perlakuan, sedangkan *Independent T-Test* digunakan untuk membandingkan hasil antara kelompok perlakuan dan kontrol. Hasil penelitian menunjukkan kadar bilirubin serum menurun signifikan pada kedua kelompok, dengan penurunan lebih besar pada kelompok perlakuan (15,28 ± 3,01 mg/dL menjadi 7,09 ± 1,60 mg/dL, p=0,000) dibandingkan kelompok kontrol (15,94 ± 2,88 mg/dL menjadi 8,63 ± 1,57 mg/dL, p=0,000). Analisis pasca-intervensi mengonfirmasi efektivitas terapi kombinasi yang lebih unggul (p=0,043). Hasil ini menunjukkan bahwa kombinasi pijat field dengan fototerapi lebih efektif dalam menurunkan kadar bilirubin dibandingkan dengan fototerapi saja. Disimpulkan bahwa pijat Field dapat meningkatkan efektivitas fototerapi dalam menangani hiperbilirubinemia neonatal. Penelitian mendatang harus mencakup sampel yang lebih besar dan mengeksplorasi terapi tambahan untuk menurunkan bilirubin. Mengkaji durasi fototerapi, lama rawat inap, dan frekuensi buang air besar dapat memberikan wawasan lebih dalam.

Kata Kunci: Pijat Field, Hiperbilirubinemia, Neonatus, Fototerapi, Terapi Komplementer.

INTRODUCTION

The World Health Organization (2022) asserts that the initial month of life represents the most critical period for child survival (Liu et al., 2023). In 2020, nearly half (47%) of all child-related mortalities were reported during the neonatal period. While Indonesia has seen a decline in its Infant Mortality Rate (IMR), further action is required to achieve the goal of 16 per 1,000 live births by the end of 2024. In 2022, 21,447 deaths were reported among children aged 0-59 months in Indonesia, with the majority (18,281) occurring during the neonatal period (0-28 days). Of these neonatal deaths, 75.5% occurred in infants aged 0-7 days, whereas 24.5% occurred in infants aged 8-28 days (Kementerian Kesehatan Republik Indonesia, 2023). The primary causes of neonatal mortality include low birth weight (LBW) (26%), hyperbilirubinemia (9%), neonatal infections (1.8%), and hypoglycemia (0.8%) (Natashia et al., 2024; Widodo & Naufal, 2019).

Hyperbilirubinemia is a prevalent condition in newborns, accounting for three-quarters of hospital admissions during the first few weeks of life (Santoso et al., 2022). Globally, it affects–8-11% of neonates, with the highest mortality rates observed in sub-Saharan Africa and Southeast Asia (Abdellatif et al., 2020; Bante et al., 2024). Without timely intervention, hyperbilirubinemia can lead to severe complications including kernicterus, cerebral palsy, and hearing impairment (Lei et al., 2018; Purnamasari et al., 2020). Phototherapy is a widely used and effective treatment to reduce serum bilirubin levels in neonates (Novianti et al., 2017). This therapy converts bilirubin into water-soluble isomers through light exposure, enabling its elimination without the need for hepatic conjugation (Tariq et al., 2021).

Despite its efficacy, phototherapy has certain limitations and potential side effects (Korkmaz & Esenay, 2020). Extended hospital stays, maternal-infant separation, and disruptions in breastfeeding, potentially leading to lactation failure, are challenges associated with phototherapy (Novianti et al., 2017). Additionally, phototherapy can induce parental anxiety and increase healthcare costs owing to prolonged hospitalization or the need for readmission (Deshmukh et al., 2019). Adverse effects such as diarrhea, dehydration, skin rashes, retinal damage, hyperthermia, and an increased risk of seizures, especially in male infants, have also been reported (Santoso et al., 2022; Shoris et al., 2023).

In response to these challenges, various studies have explored complementary therapies, including field massage, to improve phototherapy outcomes and further reduce bilirubin levels (Setiarini et al., 2022). Field massage is a gentle manipulation technique performed on the face, chest, abdomen, limbs, and neck to stimulate the vagus nerve and enhance metabolic processes (Apriyani et al., 2021; Widodo & Naufal, 2019). This low-cost therapy has shown no negative side effects (Korkmaz & Esenay, 2020; Santoso et al., 2022). Studies conducted on neonates with indirect hyperbilirubinemia undergoing phototherapy combined with field massage administered two–three times daily have demonstrated increased bowel movements and reductions in bilirubin levels. Scientists have proposed that massage stimulates the vagus nerve and lowers bilirubin concentration by enhancing dietary intake and bowel movement frequency (Korkmaz & Esenay, 2020). This study aimed to evaluate the efficacy of field massage as a complementary therapy to phototherapy for reducing serum bilirubin levels in neonates with hyperbilirubinemia.

RESEARCH METHODS

This study used a quasi-experimental research design with a two-group pretest-posttest design and a control group design. The study population consisted of neonates with hyperbilirubinemia who received phototherapy in the Lily Room of the RSUD Abdoel Wahab Sjahranie. The sample met the following inclusion criteria.

1) Newborns aged 0-28 days
2) Physiological jaundice (occurring between 24 hours to 2 weeks)
3) Total serum bilirubin level ≥10 mg/dL according to the hyperbilirubinemia criteria at RSUD Abdoel Wahab Sjahranie.

The exclusion criteria were as follows.

1) Infants meeting the contraindications criteria for field massage, including fever (>37.50°C); elevated vital signs such as increased respiratory rate indicative of respiratory distress, hypoxia, or asphyxia; increased pulse rate, potentially indicating severe anemia, hypoxia, hyperthyroidism, myocarditis, or Kawasaki syndrome; and infants presenting with lethargy.
2) Parents or legal guardians declining to provide informed consent.

The research instruments used included a field massage checklist, phototherapy standard operating procedure (SOP), laboratory examination result sheets, and a patient identity questionnaire designed based on the variables under investigation.

The study sample was divided into two groups: treatment and control. The treatment group consisted of 10 hyperbilirubinemic neonates who received a combination of field massage and phototherapy, while the control group consisted of 10 hyperbilirubinemic neonates who received phototherapy only. The initial bilirubin level (pre-test) was measured prior to the commencement of phototherapy, whereas the final bilirubin level (post-test) was measured upon completion of the series of phototherapy sessions, as per the recommendation of the attending physician. Phototherapy was administered in accordance with the standard operating procedure (SOP) at RSUD Abdoel Wahab Sjahranie Samarinda, while field massage was administered according to the checklist twice daily (at 07:00 and 16:00) for a duration–15-20 minutes. This massage stimulation was administered a minimum of 1 h after feeding. Field massage provides stimulation focused on the areas of the face, abdomen, and chest, aimed at stimulating the vagus nerve to increase the body's metabolism (Widodo & Naufal, 2019).

Data were collected through assessment, examination, and intervention. This study was conducted in the Lily Room of RSUD Abdoel Wahab Sjahranie from March 1 to June 6, 2024. Data analysis was conducted using SPSS 16.0 with a 95% Confidence Interval (CI). The Shapiro-Wilk test was used to test the normality of the data. Statistical analysis of the difference in bilirubin levels before and after treatment (pre-posttest) was performed using the Paired T-Test, whereas analysis of the difference in effect between the treatment and control groups was performed using the independent t-test. This study was approved by the Health Research Ethics Committee of RSUD Abdoel Wahab Sjahranie Samarinda (ethics number: No.387/KEPK-AWS/III/2024).

RESULTS

Table 1. Frequency Distribution of Respondents' Characteristics (n=20).

Respondent Characteristics	Control		Treatment	
	n	Percent (%)	n	Percent (%)
Age				
Early neonate (0-7 days)	8	80	9	90
Late neonate (8-28 days)	2	20	1	10

Respondent Characteristics	Control		Treatment	
	n	Percent (%)	n	Percent (%)
Gender				
Male	5	50	3	30
Female	5	50	7	70
Birth weight				
< 2500 grams	2	20	3	30
2500 – 4000 grams	8	80	7	70
Gestational age at birth				
Premature	2	20	3	30
Term	8	80	7	70

Table 1 shows that most of the neonates were early neonates (0-7 days), with 80% (n=8) in the control group and 90% (n=9) in the treatment group. The control group had an equal sex distribution (50% each), while the treatment group had more females (70%) than males (30%). The predominant birth weight category was 2500-4000 grams, encompassing 80% of the control group and 70% of the treatment group. Most neonates were born at term (80% and 70% in the control and treatment groups, respectively). Premature births were slightly higher in the treatment group (30%) compared to the control group (20%). Overall, the demographic characteristics of both groups were similar, with minor differences in the sex distribution and birth weight.

Table 2. Saphiro-wilk test results.

Group	Statistics	*Sig**	Sig* (Data Transformation)
Control			
Pre-test	0.836	0.040	0.096
Post-test	0.892	0.177	0.071
Treatment			
Pre-test	0.864	0.085	-
Post-test	0.851	0.059	-

** Saphiro-wilk test*

Table 2 shows the Shapiro-Wilk test for the pre-test data of the control group showed a significance value of 0.040, indicating a non-normal distribution ($p < 0.05$). After data transformation, the significance value increased to 0.096, suggesting an approach to normality. The post-test data of the control group had a significance value of 0.177, indicating normal distribution ($p > 0.05$). After the transformation, this value was 0.071, which was closer to normal. In the treatment group, the pre-($p = 0.085$) and post-test ($p = 0.059$) data had significance values near 0.05, within normal limits ($p > 0.05$); hence, no transformation was needed, and parametric tests were used for bivariate analysis.

Table 3. Bivariate Analysis of Bilirubin Levels Before and After Phototherapy in the Control Group (n=10).

Bilirubin level	n	Median (Min-Max)	Mean ± SD	Average Difference	p-value*
Pre-test	10	15.37 (13.19-21.2)	15.94 ± 2.88	7.31	0.000
Post-test	10	9.1 (5.6-10.3)	8.63 ± 1.57		

** paired T-test*

Table 3 shows the mean difference in bilirubin level before and after post-phototherapy was 7.31 mg/dL. The paired t-test results yielded a p-value of 0.000, indicating that the difference in bilirubin levels before and after phototherapy was significant ($p < 0.05$). This finding suggests that phototherapy effectively reduced bilirubin levels in the control group.

Table 4. Bivariate Analysis of Bilirubin Levels Before and After Phototherapy in the Treatment Group (n=10).

Bilirubin level	n	Median (Min-Max)	Mean ± SD	Average Difference	p-value*
Pre-test	10	14.4 (12.1-21.4)	15.28 ± 3.01	8.19	0.000
Post-test	10	6.65 (5.4-9.9)	7.09 ± 1.60		

* *paired T-test*

Table 4 shows that the average bilirubin reduction was 8.19 mg/dL. A paired t-test produced a p-value of 0.000, signifying a statistically significant decrease in bilirubin levels pre- and post-intervention ($P < 0.05$). These results indicate that combining field massage with phototherapy is significantly more effective in lowering neonatal bilirubin levels than is phototherapy alone.

Table 5. Differences in Bilirubin Levels Before and After Phototherapy in the Control Group and Treatment Group.

Bilirubin level	Group	n	Mean ± SD	p-value*
Pre-test	Control	10	15.94 ± 2.88	0.624
	Treatment	10	15.28 ± 3.01	
Post-test	Control	10	8.63 ± 1.57	0.043
	Treatment	10	7.09 ± 1.60	

** independent T-test*

Table 5 shows the mean bilirubin level before phototherapy was 15.94 ± 2.88 mg/dL in the control group and 15.28 ± 3.01 mg/dL in the treatment group. An independent t-test yielded a p-value of 0.624, indicating no significant difference between the groups at the pretest stage ($p > 0.05$). Post-intervention, bilirubin levels decreased to 8.63 ± 1.57 mg/dL in the control group and to 7.09 ± 1.60 mg/dL in the treatment group. The independent t-test for posttest data showed a p-value of 0.043, indicating a significant difference between the groups after the intervention ($p < 0.05$). These results suggest that combining field massage with phototherapy is more effective in reducing bilirubin levels than is phototherapy alone.

DISCUSSION

Hyperbilirubinemia, a common neonatal condition, is characterized by elevated bilirubin levels in the blood and requires prompt intervention to prevent severe complications such as kernicterus and neurological impairment (Boskabadi et al., 2020; Rahayu et al., 2020). Effective management is crucial for both immediate and long-term health outcomes in neonates (Jazayeri et al., 2021). As the standard treatment, phototherapy converts free bilirubin into colorless, water-soluble molecules. This process helps prevent bilirubin-induced encephalopathy by reducing unconjugated plasma bilirubin levels, enabling its direct excretion in bile or urine (Wang et al., 2021). Although phototherapy is highly effective, it has limitations such as prolonged treatment duration and potential adverse effects, including rash, hyperthermia, dehydration, bronze baby syndrome, and retinal damage. A recent epidemiological survey found that intense phototherapy increased mortality rates in newborns weighing 501–750 g and prior phototherapy increased the risk of childhood cancer (Itoh et al., 2017). These limitations highlight the need for adjunctive therapies to improve clinical outcomes. Field massage has emerged as a promising complementary therapy for neonatal hyperbilirubinemia management. This non-invasive technique stimulates specific body areas, activates the vagus nerve, and enhances digestive function, which promotes bilirubin excretion (Santoso et al., 2022).

Before the intervention, the pretest bilirubin levels were comparable ($p=0.624$), confirming similar baseline characteristics. In the control group, phototherapy alone resulted in a significant reduction in bilirubin levels, from 15.94 ± 2.88 mg/dL to 8.63 ± 1.57 mg/dL ($p= 0.000$). This confirms the efficacy of phototherapy as a standard treatment. Phototherapy converts non-conjugated bilirubin into a non-toxic form that cannot cross the blood-brain barrier, allowing its

excretion via bile and urine (Kenari et al., 2020). The treatment group, which received both field massage and phototherapy, exhibited an even greater reduction in bilirubin levels, from 15.28 ± 3.01 mg/dL to 7.09 ± 1.60 mg/dL (p = 0.000). This finding suggests that field massage when combined with phototherapy, enhances its effectiveness in managing hyperbilirubinemia. The technique primarily targets stimulation of the facial, thoracic, and abdominal regions, activating the vagus nerve and improving digestive organ function. This increased digestive activity facilitates toxin excretion through feces and urine (Widodo & Naufal, 2019; Zaki & Thabet, 2019). In this study, field massage was administered twice daily for 15-20 minutes during phototherapy sessions.

The analysis showed a significant difference in the post-test bilirubin levels between the two groups after the intervention (p=0.043), with the treatment group experiencing a more substantial reduction. This decrease can be attributed to the synergistic effects of field massage, which stimulates the vagus nerve, thereby promoting digestion and bilirubin excretion. These results align with those of Novianti et al. (2017), who found that while both groups showed significant bilirubin reduction after phototherapy, those receiving additional massage experienced greater reduction (Novianti et al., 2017). The field technique to massage infants from days 1 to 5 significantly reduced bilirubin levels on days 2 to 5 and overall blood bilirubin levels on day 4 (Rahani et al., 2017). Increased gastrointestinal motility and stool output, which reduce enterohepatic circulation, are thought to be underlying mechanisms (Garg et al., 2019). Similarly, Zaki and Thabet (2019) reported that neonates receiving phototherapy combined with massage had more frequent bowel movements, with significant differences observed between the second and sixth day of treatment (Novianti et al., 2017).

A more rapid reduction in serum bilirubin levels could shorten the duration of phototherapy and hospitalization, potentially lowering healthcare costs and reducing family stress (Zhang et al., 2019). Ahmadipour et al. found that combining massage and phototherapy significantly reduced bilirubin levels, urine volume, and hospital stay for full-term newborns with hyperbilirubinemia (Ahmadipour et al., 2019; Boskabadi et al., 2020). The findings of this study suggest that field massage can be effectively integrated into the treatment regimen for neonatal hyperbilirubinemia, enhancing natural excretory processes that help eliminate bilirubin. Furthermore, this combined approach may shorten hospital stays and alleviate the financial and emotional burden associated with extended treatment.

Despite promising results, the small sample size (n=20) limits the generalizability of these findings. Future research with larger sample sizes is needed to increase statistical power and validate these outcomes. Additionally, unmeasured variables such as dietary intake, breastfeeding practices, and underlying health conditions that might affect bilirubin levels were not considered. Further studies are needed to examine these factors to provide a more comprehensive understanding of the optimal management of neonatal hyperbilirubinemia.

CONCLUSION

The administration of field massage as a complementary therapy to phototherapy has proven to be effective in reducing bilirubin levels in neonates with hyperbilirubinemia. Implementation of this technique in hospital settings is recommended to shorten the duration of phototherapy, reduce hospitalization time, and mitigate the potential risks associated with the side effects of phototherapy. Future research should focus on larger sample sizes and explore the integration of additional complementary therapies to further reduce serum bilirubin levels. Moreover, investigating variables such as phototherapy duration, length of hospitalization, and frequency of bowel movements in neonates would provide a more comprehensive understanding of the overall impact of these interventions.

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