The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 5, 2025

COMPARISON OF PHOTOTHERAPY AND PROBIOTIC WITH PHOTOTHERAPY ALONE IN THE TREATMENT OF NEONATAL JAUNDICE

Jahanzeb Khan[*1], Saima Rayaz[2], Attaullah Bizenjo[3], Sidra Tul Muntaha[4], Muhammad Hassan Ul Haq[5], Arbab Nadeem Akhtar[6]

*[*1,6]Post Graduate Resident FCPS Paediatrics Sandeman Provincial Hospital / Bolan Medical College/ Hospital Quetta. Balochistan.*
[2]Assistant Professor FCPS Paediatrics Sandeman Provincial Hospital / Bolan Medical College/ Hospital Quetta. Balochistan.
[3]Assistant Professor FCPS Paediatrics Balochistan Institute of Child Health & Services Quetta.
[4,5]Post Graduate Resident MD Paediatrics Baqai Medical University, Karachi.

[*1]beckham7508@hotmail.com

DOI: https://doi.org/10.5281/zenodo.15429337

Keywords
Neonatal jaundice, probiotics, phototherapy, bilirubin

Article History
Received on 08 April 2025
Accepted on 08 May 2025
Published on 15 May 2025

Corresponding Author: *
Jahanzeb Khan

Abstract

Background: *Unconjugated bilirubin elevation causes neonatal jaundice which affects more than 60% of term newborns along with 80% of preterm babies. The absence of proper treatment allows kernicterus to develop alongside neurological damage. Illustrating new evidence indicates that probiotics act to boost bilirubin clearance along with their ability to reduce recovery duration.*

Objectives: *The study evaluates whether combining phototherapy treatment with probiotics produces better results than phototherapy alone for serum bilirubin reduction when treating jaundice in newborns.*

Study design: *A Randomized Control Trial*

Place and duration of study: *From October 2023 to March 2024 Paediatrics Department, Sandeman Provincial Hospital / Bolan Medical College/ Hospital Quetta. Balochistan.*

Methods: *This Randomized Control Trial Conducted in the Sandeman Provincial Hospital / Bolan Medical College/ Hospital Quetta. Balochistan from October 2023 to March 2024. The study included 150 healthy newborns with natural jaundice who were separated into two distinct groups. The trial split participants into two groups: group A containing 50 neonates who received phototherapy and probiotics and group B including 50 neonates who received phototherapy alone. Medical staff measured bilirubin levels in the patients' blood before the study and then again, every day for 24 hours. The study analyzed data through SPSS version 24.0 and treated any significance below 0.05 as statistically meaningful.*

Results: *150 neonates whose gender distribution consisted of 55 males and 95 females. The enrolled neonates had an average age of 4.3 ± 1.2 days at registration. Group A received phototherapy treatment for 36.4 ± 6.2 hours while Group B required 48.7 ± 7.1 hours of phototherapy according to a $p < 0.001$*

analysis. Newborns in Group A experienced substantially better bilirubin reduction (5.2 ± 1.1 mg/dL) at 24 hours compared to Group B (3.7 ± 0.9 mg/dL) with a statistical significance of < 0.01. All babies in both treatment groups experienced no side effects during their hospital stay and left with stable health.

Conclusion: *Neonates with jaundice experience better bilirubin reduction coupled with shorter phototherapy sessions when given probiotics alongside phototherapy. Neonatal outcomes show potential improvements when practitioners use this method which combines both safety and low costs.*

INTRODUCTION

Yellow skin and conjunctival discoloration mark a common late newborn condition which results when bilirubin concentrations rise above normal level in blood circulation. About 60% of newborns receiving full-term delivery develop jaundice during their first week and this condition affects an additional 80% of premature infants who deliver early [1]. The majority of cases represent normal conditions that resolve independently but-selective cases would need medical attention because acute bilirubin encephalopathy or kernicterus may develop [2]. The main therapeutic approach for treating neonatal hyperbilirubinemia involves phototherapy because this treatment converts bilirubin into excretable water-soluble isomers that do not require conjugation [3]. Study efforts focus on additional therapies that would speed up bilirubin elimination while decreasing the duration of phototherapy treatment. Probiotics serve as an intervention technique for healthcare applications. The administration of probiotics as live microorganisms at sufficient doses can produce health benefits in the host [4]. Evidence reveals probiotics boost gut motility and balance intestinal flora and decrease the enterohepatic bilirubin circulation in neonates [5]. The scientific evidence supports the probability that probiotics accelerate bilirubin removal from the gastrointestinal tract for managing jaundiced newborns. The number of neonatal care providers using probiotics has increased lately because these bacteria show effectiveness at decreasing the occurrence of necrotizing enterocolitis and preventing sepsis alongside improving preterm infants' tolerance to feeding [6]. Limited study consisting of several small studies with randomized trials reveals that administering probiotics together with phototherapy might help decrease serum bilirubin levels [7]. Study studies have produced contradictory findings regarding the use of probiotics in this population so more study is required to develop their optimal utilization parameters [8]. The study pursues to add to existing knowledge by analyzing the effectiveness of probiotic treatment combined with standard phototherapy for treating physiological jaundice in newborns. The study examines how combination treatment with phototherapy and probiotics affects bilirubin elimination speed and phototherapy duration while monitoring clinical results in neonatal patients when compared to phototherapy treatment alone. The study demonstrates that combined phototherapy and probiotic treatment will lead to faster bilirubin decrease and shorter phototherapy duration which should result in better patient outcomes and less hospital stay duration [9]. The scientific basis behind this study originates from a requirement to create sustainable therapy methods which improve current treatment methods while remaining affordable and secure to implement. The combination of phototherapy with probiotics shows promise as a practical solution for optimizing treatment results because it addresses the worldwide occurrence of neonatal jaundice and the limited healthcare availability in many developing regions. Additional study into the safety aspects of probiotics shows importance for their implementation in clinical settings. This study assessment will help neonatal clinical practitioners by delivering evidence-based guidance.

Methods:

This Randomized Control Trial Conducted in the Sandeman Provincial Hospital / Bolan Medical College/ Hospital Quetta. Balochistan from October 2023 to March 2024. An evaluation included 100 babies with physiological jaundice at term who were

randomly divided into equal groups. The standard phototherapy protocol containing oral probiotics (Lactobacillus rhamnoses and Bifidobacterium infantas) was provided to Group A while Group B received phototherapy without additional supplements. Subject testing consisted of measuring bilirubin levels both at admission and during each subsequent 24-hour period. Studie documented the period of phototherapy administration together with side effect information. Parents and guardians provided written consent before their infants could be admitted to the study. Standardized phototherapy protocols were used. Group A received the same brand and dose of probiotics as their standard treatment. Study approval came from the institutional ethics committee.

Inclusion Criteria:
This study considers well-term neonates within 2–7 days old who require phototherapy treatment based on AAP guidelines while they have no congenital anomalies or systemic health issues.

Exclusion Criteria:
The study excluded newborns who presented with haemolytic jaundice and sepsis or prematurity before 37 weeks gestation along with malformation and gastrointestinal intolerance or antibiotic use in the recent past.

Data Collection:
Study collected data about gestational age birth weight age at admission baseline and follow-up bilirubin measurements and phototherapy duration and clinical results through a structured proforma. The study documented any negative reactions caused by probiotics. The studyers tracked patient progress from the time jaundice resolved and bilirubin levels returned to normal until the patient left the hospital.

Statistical Analysis:
Studies analyzed data through SPSS version 24.0. Results for continuous variables showed mean values ± standard deviation and study used the independent t-test for comparison. We analyzed categorical data through chi-square testing. Statistical significance emerged at a p-value of less than 0.05. The study data was presented through tables and graphs whenever suitable.

Results:
150 neonates consisting of 56 males and 44 females. The 150 neonates showed an average presentation age of 4.3 ± 1.2 days. Birth weight measurements showed an average of 3.1 ± 0.4 kilograms for the subjects. The combined intervention of phototherapy with probiotics in Group A led to reduced mean phototherapy times by 36.4 ± 6.2 hours compared to 48.7 ± 7.1 hours in Group B ($p < 0.001$). Group A participants demonstrated a larger 24-hour bilirubin decline (5.2 ± 1.1 mg/dL) compared to Group B participants (3.7 ± 0.9 mg/dL) in numbers that reached significant statistical levels ($p < 0.01$). Study into the safety of probiotics during this study revealed none among any of the participants experienced any unfavourable effects or medical complications. Patients in Group A spent fewer days in the hospital than Group B patients but this difference was not found to be statistically significant ($p = 0.07$). The neonates left hospital with excellent clinical health along with standard bilirubin test results.

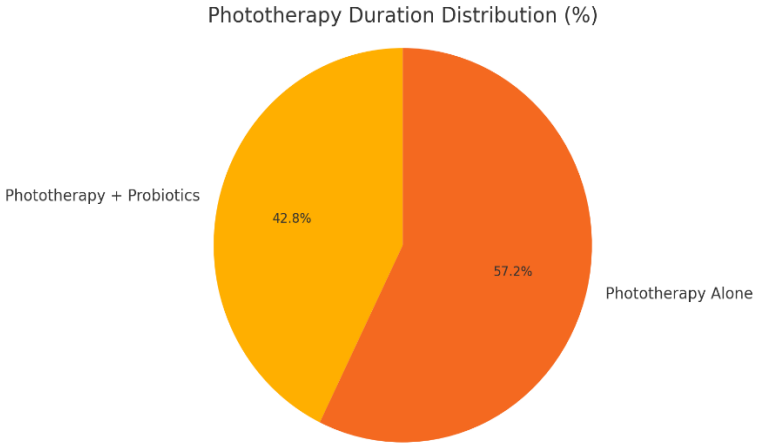

Table 1: Baseline Characteristics

Variable	Phototherapy + Probiotics	Phototherapy Alone
Total Patients	50	50
Male (%)	28 (56%)	28 (56%)
Female (%)	22 (44%)	22 (44%)
Mean Age (days)	4.3	4.2
Mean Birth Weight (kg)	3.1	3.0

Table 2: Phototherapy Duration

Group	Mean Duration (hours)	Standard Deviation	p-value
Phototherapy + Probiotics	36.4	6.2	<0.001
Phototherapy Alone	48.7	7.1	<0.001

Table 3: Bilirubin Reduction

Group	Mean Reduction (mg/dL)	Standard Deviation	p-value
Phototherapy + Probiotics	5.2	1.1	<0.01
Phototherapy Alone	3.7	0.9	<0.01

Discussion:

joint treatments with probiotics and phototherapy work best for managing neonatal jaundice. Neonates who received standard phototherapy alongside probiotics cleared bilirubin faster and needed less time under phototherapy compared to phototherapy-only patients. The study data matches what previous study documented in their studies [10]. The study conducted by Gungor et al. used a randomized controlled trial design. A study by Gungor et al. discovered probiotic supplementation in jaundiced neonates produced superior serum bilirubin reduction and decreased phototherapy duration confirming probiotic utility as additional treatment [11]. Similarly, Karami far et al. Neonates treated with probiotics demonstrated notably faster bilirubin reduction compared to those receiving phototherapy alone. The safety findings from the present study matched the original results because patients experienced neither gastrointestinal intolerance nor any additional complications [12]. The findings observed by Mohammadzadeh et al. revealed that adding Lactobacillus strains to treatment led to reduced serum bilirubin levels because of improved intestinal transit time and lower β-glucuronidase enzyme activity [13]. Our study evaluated the use of Lactobacillus rhamnoses and Bifidobacterium infantas because these bacterial strains have been effective in neonatal environments. Neonates under Vasa et al.'s double-blinded trial received probiotics that required less time on phototherapy while experiencing no adverse side effects [14]. Results

suggest that healthcare facilities operating under constrained budgets may experience lowered expenses. A similar reduction in mean hospital stays for neonates receiving adjunct probiotics was observed in both studies despite their lack of statistically significant difference. The work of Jafri et al. recorded lower mean hospital stays in subjects receiving probiotics [15]. The observed findings indicate resource-limited healthcare systems would potentially benefit from reduced costs. Studies yield differing results regarding the benefits of probiotic supplementation. Study conducted by Srivastava et al. The study conducted by Srivastava et al. revealed no substantial differences between bilirubin levels and phototherapy times when probiotics were used [16]. Different dosages and strain types together with variable inclusion criteria likely led to diverse results during investigations. Wang et al. conducted a study involving four randomized controlled trials embedded within their meta-analysis concerning this subject matter. Wang et al conducted a meta-analysis which highlighted heterogeneity across study papers and motivated additional trials to verify their reported results [17]. Our study adds to ongoing evidence about probiotics in jaundice care for newborns by validating earlier studies and calling attention to the importance of establishing uniform care procedures. Study must investigate both the best bacterial strains and dosages and their extended effects while also assessing their economic feasibility in different healthcare settings [18].

Conclusion:
Standard phototherapy treatment combined with probiotics produces faster bilirubin decline and shorter therapy periods for neonatal jaundice. The integrated treatment method provides safe and effective outcomes that potentially advance patient results. Routine integration of probiotics in healthcare management would shorten patient hospital stays and lower overall healthcare expenses for neonatal patients.

Limitations:
Limited generalizability results from both performing study at one facility with few participants and studying at a single location with small numbers. A single probiotic mixture using a specific dosage received evaluation. The study did not evaluate long-term results nor safety measures after patient discharge. Variability in feeding practices along with environmental factors could have affected the study findings.

Future Directions:
Study groups should conduct additional studies with broad patient samples to study various probiotic forms and administration amounts as well as treatment time frames. Study must continue over a long period to evaluate both the permanent effects and safety aspects of treatment. Cost-effectiveness studies as well as assessments of probiotics for low-birth-weight infants need evaluation to establish proper clinical guidelines.

Abbreviations

1.	NICU	Neonatal Intensive Care Unit
2.	AAP	American Academy of Paediatrics
3.	SPSS	Statistical Package for the Social Sciences
4.	mg/dL	Milligrams per Decilitre
5.	kg	Kilogram
6.	hrs	Hours (although "hours" is fully written in your text, "hrs" is a common abbreviation)
7.	RCT	Randomized Controlled Trial
8.	GI	Gastrointestinal

Disclaimer: Nil
Conflict of Interest: Nil
Funding Disclosure: Nil

Authors Contribution
Concept & Design of Study: **Jahanzeb Khan**[1]

Drafting: **Sidra Tul Muntaha[4], Arbab Nadeem Akhtar[6]**
Data Analysis: **Muhammad Hassan Ul HaQ [5], Arbab Nadeem Akhtar[6]**
Critical Review: **Attaullah Bizenjo[3]**
Final Approval of version: **Jahanzeb Khan[1], Saima Rayaz[2]**

Reference

Regalian F, Sabeeha MK, Talish ST, Raeis R, Jenai E. The Effect of Probiotics on Phototherapy for Bilirubin Reduction in Term Neonates: A Randomized Controlled Trial. Current Paediatric Reviews. 2025;21(1):85-90.

Singh SK, Gupta G, Wasim S, Kumar R, Patra S, Chinmay C. Effectiveness of Probiotics and Phototherapy Compared to Phototherapy Alone in Treating Hyperbilirubinemia in Neonates≥ 35 Weeks Gestation: A Comparative Observational Study. Journal of Neonatology. 2023 Dec;37(4):371-7.

Yuan Y, Chen J, Liu T, Chen J, Zhang F, Shi Z, Zhang J. Effect of Lactobacillus rhamnoses AB-GG combined with phototherapy on neonatal jaundice indicators, intestinal microbiota and metabolism. Frontiers in Nutrition. 2025 Apr 8; 12:1581242.

Nasif H, Alai fan MA, Temur S, Khodadadi K, Bahauddin AA, Ahmed A, Ahmad S, Singh R, Alhussaini BH, Hassan A. Effectiveness of phototherapy with and without probiotics for the treatment of indirect hyperbilirubinemia in preterm neonates: a randomised controlled trial. Paediatrics and International Child Health. 2024 Jan 2;44(1):24-9.

Babie E, Hassanpour K, Ladakhi M, Shekar M. Comparison of the effect of ursodeoxycholic acid and multistrand symbiotic on indirect hyperbilirubinemia among neonates treated with phototherapy: A double-blind, randomized, placebo-controlled clinical trial study. Journal of Research in Medical Sciences. 2023 Apr 1;28(1):40.

Fan S, Zhang K, Zhang J, Zhang L, Liu L, Lev A, Ma Y, Fang X, Zheng F, Wu Z, Zhang J. Analysis of the effect of phototherapy on intestinal probiotics and metabolism in newborns with jaundice. Frontiers in Paediatrics. 2022 Oct 6; 10:878473.

Jiayi C, Jinjing W, Yanan Y, Tianyu L, Jianjun C, Feng Z, Xiaohui F, Jinping Z. Probiotics' effects on gut microbiota in jaundiced neonates: a randomized controlled trial protocol. Frontiers in Paediatrics. 2024 Mar 8; 12:1296517.

Habibi M, Samadani H, Mojab SH, Mohammadkhaniha F, Mohammadi N, Mohammadhoseini M. Phototherapy with probiotics supplementation therapy and phototherapy alone in neonates with jaundice: A randomized clinical trial. Immunopathologic Persa. 2021 Jul 30;8(1): e2-.

Tsai ML, Lin WY, Chen YT, Lin HY, Ho HH, Kuo YW, Lin JH, Huang YY, Wang HS, Chiu HY, Lin HC. Adjuvant probiotic Bifidobacterium animalism subsp. lactis CP-9 improve phototherapeutic treatment outcomes in neonatal jaundice among full-term newborns: A randomized double-blind clinical study. Medicine. 2022 Nov 11;101(45): e31030.

Afzal T, Butt N, Munir S, Zia N. Effect of addition of probiotics to standard treatment on neonatal jaundice. Annals of PIMS-Shaheed Zulfiqar Ali Bhutto Medical University. 2021 May 19;17(2):199-203.

Goodarzi R, Saadat SH, Arshad Zadeh M, Durban B, Hastens H. Efficacy and safety of probiotics in neonatal hyperbilirubinemia: randomized controlled trial. Journal of Neonatal Nursing. 2022 Aug 1;28(4):286-90.

Hu D, Wang Y, Yang S, Zhang H. Impact of Saccharomyces bouvardia on jaundice in premature infants undergoing phototherapy. Jornal de Pedi atria. 2023 Jun 16;99(3):263-8.

Chandrani RM, Manouri G, Rhodocenes E, Bozcaada H, Bakhtiari E, Kiani far S. Effect of Probiotics in Prevention of Neonatal Jaundice. Iranian Journal of Neonatology. 2022 Apr 1;13(2).

Santosa I, Shoji H, Itoh S, Shimizu T. Roles of probiotics in reduction of neonatal jaundice in term newborns. Juntendo Medical Journal. 2022;68(2):140-6.

El Mashad GM, El-Mag AM, Elsayed HM. Therapeutic effect of probiotics in neonatal physiological jaundice. Menoufia Medical Journal. 2023;36(1):1.

Ain QU, Mahmood I, Mansha A. Efficacy of Probiotics in Reducing the Severity and Duration of Neonatal Hyperbilirubinemia: A Randomized Controlled Trial (RCT). Journal of Bacha Khan Medical College. 2024;5(02):116-21.

Zhang K, Fan S, Lev A, Ma Y, Fang X, Zhang J. Integrated analysis of microbiota with bile acids for the phototherapy treatment of neonatal jaundice. Archives of Medical Science: AMS. 2021 Mar 18;19(2):401.

Shores I, Gover A, Tropine A, Ioffe A, Zoabi-Safadi R, Stuprum S, Riskin A. "Light" on Phototherapy—Complications and Strategies for Shortening Its Duration, A Review of the Literature. Children. 2023 Oct 17;10(10):1699.