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The Effect of Tunnel versus Conventional Phototherapy on the T Lymphocytes in Full Term Neonates with Hyperbilirubinemia

Thesis

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Ahmed Mohammed Ali Saleh

List of Contents

List of Abbreviations

Abbr.	Full-term
AAP	**:** American Academy of Pediatrics
B/A	**:** Bilirubin /albumin
BDG	**:** Bilirubin diglucuronide
BMG	**:** Bilirubin monoglucuronide,
CBC	**:** Complete Blood Count
CMV	**:** Cyto megalo virus
CN-I	**:** Crigler-Najjar syndrome type I
CN-II	**:** Crigler-Najjar syndrome type II
CO	**:** Carbon monoxide
DAT	**:** Direct antiglobulin test
DNA	**:** Deoxyribonucleic acid
EGF	**:** Epidermal growth factor
ETCOc	**:** End Tidal Carbon Monoxide concentration
G6PD	**:** Glucose -6-phosphate dehdrogenase
GMP	**:** Guanosine monophosphate
HDN	**:** Hemolytic disease of newborn
HO	**:** Heme oxygenase
IVIG	**:** Intravenous immunoglobulin
K-EDTA	**:** k-ethylene diamine tetra-acetic acid
LED	**:** Light-emitting diodes
MPS	**:** Metalloporphyrins
PK	**:** Pyruvate kinase
SnMP	**:** Tin-mesoporphyrin
TCB	**:** Trans-cutaneous bilirubin
TSB	**:** Total serum bilirubin
UA/V	**:** Umbilical artery/vein

UCB **:** Umbilical cord blood
UDPGT **:** Uridine 5'-diphospho-glucuronosyltransferase
UGT1A1 **:** Isoenzyme 1A1 of UDP-glucuronosyltransferase
UVA **:** Ultraviolet A
UVB **:** Ultraviolet B

List of Tables

List of Figures

Abstract

Background: Neonatal jaundice is one of the most common conditions. Phototherapy has been accepted as the standard treatment for neonatal jaundice and the decline in the number of exchange transfusions in recent years is, at least in part, likely a direct reflection of the effectiveness of phototherapy at treating hyperbilirubinemia. However, this treatment modality also has some complications. One possible harmful consequence is potential immunotoxic effects by affection of lymphocytes subtypes which can affect the immune system functions in infants. **Aim of the Work:** current study was performed to compare the effect of both conventional and tunnel phototherapy on lymphocytes subsets in term neonates (≥37weeks) with unconjugated hyperbilirubinemia. **Patients and Methods:** The present study was conducted on 60 term neonates (≥37weeks) 40 of them with unconjugated hyperbilirubinemia admitted to NICUs in Ain-Shams University hospital during the period from January 2019 to July 2019. They were randomly assigned to 3 groups: 20 patients were exposed to conventional phototherapy and 20 patients were exposed to tunnel phototherapy and the other 20 healthy full term were assigned as control group. Total serum bilirubin (TSB), direct serum bilirubin (DSB), CBC, CD4 and CD8 percentages and absolute count were measured before and 48 h after phototherapy in the phototherapy groups. Baseline lab was done in the control group at once. **Results:** significant decrease in total and direct bilirubin post-phototherapy in both phototherapy groups proved that ***tunnel*** phototherapy is as effective as conventional phototherapy as both provided rapid decrease in bilirubin levels. As regards the effect of phototherapy on lymphocytic count, we found that lymphocytic count significantly decreased post-phototherapy in both phototherapy groups. As regards the effect of phototherapy on CD4+ and CD8+ percentages, we found that CD4+ % significantly decreased post-phototherapy in conventional phototherapy group. Moreover, when we measured CD4+ and CD8+ absolute counts, we found that CD4+ and CD8+ absolute counts significantly decreased post-phototherapy in both phototherapy groups. In the view of the effect of phototherapy on CD4/CD8 ratio, we found that the ratio significantly increased in tunnel phototherapy group. **Conclusion:** Conventional and Tunnel phototherapy which are used in the treatment of neonatal hyperbilirubinemia, affects the function of the immune system in newborns via alterations in CD4+ and CD8+ absolute counts.

Key words: Tunnel, conventional Phototherapy, T Lymphocytes, Full-term Neonates, Hyperbilirubinemia

Introduction

Neonatal jaundice is one of the most common condition that requires medical attention in newborns as approximately 60% of term and 80% of preterm newborns suffer from jaundice in the first week of life ***(Brits et al., 2018)***.

The yellow discoloration of the skin and sclera in newborns with jaundice is the result of accumulation of unconjugated bilirubin. In most infants, unconjugated hyper-bilirubinemia reflects a normal transitional phenomenon. However, in some infants, serum bilirubin levels may excessively rise which can be a cause for concern ***(El Mashad et al., 2019).***

Phototherapy is the primary treatment in neonates with unconjugated hyperbilirubinemia. This therapeutic principle was discovered in England in the 1950s and is the most widespread therapy used in newborns ***(Mreihil et al., 2010)***. It involves exposing the infant's skin to light of specific wavelength (420-470 nm) ***(Jahanshahifard et al., 2012).***

Its efficacy is dependent on the color (wavelength) and intensity (irradiance) of the light emitted during phototherapy, the exposed body surface area as well as the duration of the exposure ***(Kanmaz et al., 2017).***