

## Review Article

# Bili blanket phototherapy

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### ABSTRACT

Jaundice is a common condition in neonates, occurring in 60% to 84% of late term and term infants. Phototherapy is considered as a treatment of choice since many years in the management of unconjugated hyperbilirubinemia. Phototherapy is the use of visible light to treat severe jaundice in the neonatal period. Treatment with phototherapy is implemented in order to prevent the neurotoxic effects of high serum unconjugated bilirubin. Different types of phototherapy delivery system are in use. Bili blanket phototherapy uses fiberoptic systems that reduces or eliminates all of the potential complications of conventional phototherapy and facilitates establishment of an enhanced parent-infant bond.

**Keywords:** Bili blanket, Fiberoptic system, Hyperbilirubinemia, Jaundice, Neonate, Phototherapy

## INTRODUCTION

Jaundice is a common condition in newborn infants and is a clinical sign of excess conjugated or unconjugated bilirubin (hyperbilirubinemia). It is characterised by a yellow colouring of the infant's skin and other tissues caused by high levels of circulating unconjugated bilirubin due to the breakdown of red blood cells. There is a 60% incidence of jaundice in full term infants (1<sup>st</sup> week) and 80% incidence in preterm infants.<sup>1,2</sup>

Phototherapy is the most widely used treatment, and it has proved safe and effective for over three decades. Phototherapy is the application of fluorescent lights over the infant's skin to assist in reducing the serum bilirubin level in the infant's blood.<sup>3</sup> The aim of phototherapy is to decrease the level of unconjugated bilirubin in order to prevent acute bilirubin encephalopathy, hearing loss and kernicterus.<sup>4</sup> Blue light waves 425-475nm (nano meters) from the fluorescent lights are absorbed by the infant's skin and blood and this converts the unconjugated bilirubin to conjugated bilirubin which can be eliminated by the body via urine and stool.

The decision to start phototherapy is based on the level and rate of rise of serum bilirubin, the gestational and postnatal age of the infant and the underlying cause of the hyperbilirubinemia. Factors that influence the efficacy of phototherapy include: the light wavelength and irradiance, bilirubin level, birth weight, gestational age, postnatal age, surface area exposed, skin thickness and pigmentation and the aetiology of the jaundice.<sup>4,5</sup>

The effectiveness of phototherapy also depends on the degree of the infant's surface area exposed to the lights. Single phototherapy is when one phototherapy unit is used. Double and triple phototherapy indicates the use of 2 or 3 units concurrently. Using one or more unit at one time allows as much of the infant's body-surface as possible to be exposed to the light.

Currently available phototherapy devices use various types of light source ranging from fluorescent tubes, halogen spotlights and fiber optic systems. These devices have proven to be able to treat jaundice without risking the infant's condition and health.<sup>6,7</sup>

For over 30 years, phototherapy treatment has been used in hospitals. Hospital treatment involves rows of lights shining directly on an undressed baby (with a diaper on) whose eyes would need protection from the light with soft eye patches applied. Fiberoptic systems have been found to be as effective as conventional phototherapy for physiologic jaundice in well, term infants in the hospital and in the home. Furthermore, fiberoptic systems minimize or eliminate all of the potential complications of conventional phototherapy. Technology advancements have led to home phototherapy treatment through the use of Bili Blankets.

## DISCUSSION

A Bili blanket is a portable phototherapy device for the treatment of hyperbilirubinemia. The name is a combination of bilirubin and blanket. Other names used are home phototherapy system, bilirubin blanket, or phototherapy blanket.

### **Structure and components of Bili blanket system: (Ohmeda Bili blanket phototherapy system)<sup>8</sup>**

#### *Illuminator*

Box which contains the light bulb and electrical components. The illuminator contains a custom halogen light bulb which is the source of the therapeutic light.

#### *Fiberoptic Pad*

Transmits light from the light source to the baby through 2400 woven plastic fibers. The fiberoptic pad cable plugs directly into the illuminator. The cable transmits the light from the illuminator to the pad.

#### *Disposable Cover/Vest*

Soft, water resistant pad cover provides a comfortable surface for the baby and protects the pad. The pad should always be covered with a disposable vest or cover. The disposable cover or vest is placed over the pad and is in direct contact with the baby's skin.

### **Functioning of a bili blanket**

This system uses fiber optics and represents advanced technology in phototherapy treatment given either in the hospital or at home. A pad of woven fibers is used to transport light from a light source to your child. This covered pad is placed directly against your baby to bathe the skin in light. Absorption of this light leads to the elimination of bilirubin. The Bili Blanket system can be used 24 hours a day to provide continuous treatment if prescribed by your physician or healthcare professional. Blood will be drawn and tested daily to check bilirubin levels and determine when normal levels are reached and phototherapy is no longer needed.

A bili-blanket is a fibre-optic light source transmitted via a cable which delivers a high intensity uniform light. This device uses a halogen bulb directed into a fiberoptic mat. There is a filter that removes the ultraviolet and infrared components and the eventual light is a blue-green colour. The bili blanket provides the highest level of therapeutic light available to treat your baby. The blanket must be positioned directly next to the infant's skin to be effective. It can be used as the sole source of phototherapy or as an adjunct to conventional treatment by laying the infant on the blanket to give "double" phototherapy and increase the surface area exposed.<sup>9</sup>



**Figure 1: Baby undergoing bili blanket phototherapy.<sup>10</sup>**

#### *Advantages*

- Infant can be held with no discontinuation of treatment
- Biliblanket can be used 24 hours a day for as long as necessary.
- Can be nursed in cot instead of incubator
- Encourages infant/maternal bonding
- No heat/electrical dangers
- No insensible water loss
- Blanket more flexible/comfortable
- No discontinuation of treatment for procedures
- Compact and easily transported

#### *Contraindications*

Bili blankets are not to be used on infants less than 28 weeks gestation or infants with broken or reduced skin integrity due to the risk of dermal damage.

#### *Care to be taken for a baby in Bili blanket<sup>11-15</sup>*

Explain the need for phototherapy and the functions of the equipment to the parents as clinically indicated. Providing explanations and reassurance can reduce stress and anxiety whilst encouraging bonding.

Hand-washing should be carried out prior to commencing phototherapy and/or attending to care needs of the infant.

Parents should also be advised on hand-washing techniques for prevention of cross infection.

The light source box for the bili-blanket should be placed on a firm flat non-absorbent surface. Don't keep anything on top of the light source box or the fiber optic cable. The cot or top of incubator are not suitable places to position the box.

A disposable cover should be placed over the fibre-optic pad of the bili-blanket as per manufacturer's guidelines. Have the disposable cover as the only material between the light-emitting side of the pad and infant's skin. Change the disposable cover if it becomes soiled. Make sure as much of the infant's skin is in direct contact with the light pad. Diapers can be worn. Clothing may be worn over the pad. Wrap in a blanket ensuring biliblanket remains in direct contact with skin. By facilitating maximum exposure to the bili-blanket, the breakdown of bilirubin should occur at a faster rate.

Never place the pad on your baby's head. It should only be placed on the back.

There are 3 light settings on the unit- Low, Medium and High. The setting at which the intensity of the light box should be set must be clarified with the neonatal team.

The infant does not require eye protection while on bili-blanket however the infant's eyes should not be exposed to the covered light pad. The light can be toxic to the immature retina of a newborn's eyes.

The light pad may be left in situ during feeding, changing nappies and cuddling the infant. Ensures continuous exposure to the light source. The use of fibre optic blankets will also permit close and more frequent contact between parents and infants. Do turn off light when bathing your infant.

Monitor temperature, intake and output, weight, skin integrity and serum bilirubin levels periodically.

Continue to regularly assess and monitor the infant's peripheral and core temperature after phototherapy has been discontinued. Phototherapy lights are a heat source therefore the infant may become develop cold stress or hypothermic when the phototherapy lights/ bili-blanket is discontinued.

Perform skin and nappy care regularly.

Keep the infant clean and dry. Barrier creams can be used if stools are loose and green. Infants nursed in nappies or where the buttocks are not directly exposed to the phototherapy can have zinc and castor oil applied to areas of skin excoriation.

Be sure to disconnect the illuminator power cord before cleaning. Use a mild detergent (such as dishwashing

detergent) solution applied with a clean, soft cloth or sponge to clean the pad. Do not saturate or immerse the pad, or cable in liquid.

Do not use abrasive cleaners on the pad.

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