

## REVIEW : PENGARUH CAHAYA TERHADAP HASIL KADAR BILIRUBIN PADA SERUM BAYI IKTERIK DI RSI NU DEMAK

### The Effect Of Light Exposure To Bilirubine Levels On Serum Jaundice Infant In Hospital of Islamic NU Demak

<sup>1</sup>Eko Naning Sofyanita, <sup>2</sup>Endang Susilowaty, <sup>3</sup>Roni Afriansya

<sup>1</sup>Poltekkes Kemenkes Semarang, Jl. Woltermonginsidi no. 115 Semarang, Indonesia

<sup>2</sup>RSI NU Demak, Jl. Diponegoro, Jogoloyo, Indonesia

<sup>3</sup>Poltekkes Kemenkes Semarang, Jl. Woltermonginsidi no. 115 Semarang, Indonesia

\*e-mail : en.sofyanita@gmail.com

#### ABSTRAK

Bilirubin merupakan zat yang terbentuk dari proses penguraian eritrosit secara normal di dalam tubuh sehingga memberi warna kuning pada tinja dan urine. Pemeriksaan bilirubin di laboratorium harus terhindar dari paparan cahaya yang dapat menyebabkan penurunan kadar bilirubin serum sampai 50% dalam 1 jam karena terganggunya stabilitas bilirubin tersebut. Penelitian ini merupakan analitik crosssectional dari data primer dengan menggunakan 40 sampel serum bayi ikterik dan dilakukan pemeriksaan bilirubin direct dan bilirubin total dengan paparan cahaya dan tidak terpapar cahaya. Hasil dari pemeriksaan 40 sampel didapat hasil kadar rata-rata bilirubin total yang terpapar cahaya yaitu 8,58 mg/dl dan yang tidak terpapar cahaya 12,67 mg/dl dan kadar rata-rata bilirubin direct yang terpapar cahaya yaitu 3,98 mg/dl sedangkan yang tidak terpapar cahaya 8,71 mg/dl, sehingga dapat disimpulkan bahwa kadar bilirubin Total dan Direct pada serum bayi ikterik yang terpapar oleh cahaya lebih rendah dibandingkan dengan yang tidak terpapar cahaya.

**Kata kunci :** Bilirubin Total, Bilirubin Direct, Serum Ikterik

#### ABSTRACT

Bilirubin is a substance that is formed from the normal breakdown of erythrocytes in the body so that it gives a yellow color to the stool and urine. The test of bilirubin in the laboratory must avoid exposure to light which can cause a decrease in serum bilirubin levels by up to 50% in 1 hour due to disruption of the stability of the bilirubin. This study is a cross-sectional analytic study of primary data using 30 samples of jaundice baby serum and direct and total bilirubin test. Data collection was conducted from the primary data that is by direct test using a sample of 40 samples of infant jaundice and test of direct bilirubin and total bilirubin using methods Dichlorophenyl Diazonium. The results of the tests of 40 samples can result in the mean levels of total bilirubin were exposed to light of 8.58 mg / dl and were not exposed to light 12.67mg /dl and direct bilirubin levels mean that exposure to light is 3.98 mg / dl while the unexposed light of 8.71 mg / dl, so that it can be concluded that the levels of total and direct bilirubin in serum jaundice infants exposed to lower light compared with those not exposed to light.

**Keyword :** Total Bilirubin, Direct Bilirubin, Jaundice Serum

#### INTRODUCTION

Bilirubin is a substance that is formed from the normal breakdown of erythrocytes in the body so that it gives a yellow color to the stool and urine. The formation of bilirubin itself occurs in the reticuloendothelial system which has been liberated from red blood cells that secrete iron and break down

heme to produce tetrapinol bilirubin, which is excreted in a form that is insoluble in water (unconjugated, indirect) and then transported to cells liver, hepatocytes release bilirubin from albumin and cause it to dissolve in water by binding bilirubin to

glucuronic acid (conjugated bilirubin, direct) (Sacher & Ra, 2010).

The use of the term hyperbilirubinemia is used to describe a condition with an excessive amount of bilirubin in the blood and is characterized by the presence of jaundice or jaundice which is a yellowish color of the skin, sclera of the eyes and nails (Hockenberry & Willson, 2007).

Jaundice is a symptom that is often found in newborns. All newborns will experience a "yellowing" process known as jaundice neonatorum. The term icteric refers more to the clinical picture in the form of yellow staining. This yellow staining arises as a result of the accumulation of unconjugated bilirubin in the blood of the newborn (Muktiati, 2015). For most neonates, jaundice will be found within the first week of life. It is stated that the jaundice rate is found in 60% of term infants, 80% of preterm infants (Raisa, 2006).

Bilirubin test in patients with jaundice, the most important test is to assess the level of bilirubin in serum. Serum measurements must be carried out immediately, the serum must be kept away from light so that there is no decrease in the results of bilirubin levels (Kee, 2007).

Bilirubin consists of an open chain of four pyrrole-like rings (tetrapyrrole). In heme in contrast, the four rings are connected to a larger ring, called porphyrin, a ring very similar to the pigment phycobilin used by certain algae to capture light energy, and for phytochromic pigments used by plants to sense light. All of these contain an open chain of four pyrrolic rings. Like these other pigments, several double bonds in bilirubin isomerize the mechanism of decreasing bilirubin levels due to the influence of light, namely when light enters the energy in the form of heat it will have an effect on pyrrole 2 da 3, where the propionate group has aldehyde, ketones are included in the water where water is obtained. from the hydrogen bond obtained from the propionate group, and the bilirubin group there are 2 propionate groups which sound O mean that are close to each other so that the presence of water caused by hydrogen bonds causes the hydrogen bond to decrease when exposed to light. This reaction is used in the phototherapy of a jaundice. The E Z-

isomer of bilirubin formed after exposure to light is more soluble than the Z unilluminated Z-isomer, as it is possible that the intramolecular hydrogen bonds will be removed so as to allow an effect on the results of the examination (Maulina, 2012).

Bilirubin to be tested can be affected, among others, is sample preparation, light, and icteric samples due to the limitations of health analysts. Total bilirubin and direct bilirubin levels testing at the Laboratory Installation of the NU DEMAK Hospital, the samples were collected first so that the samples were exposed to light for too long.

## METHODS

This was analytic research with a cross-sectional approach. This study compared 40 samples for tested direct and total bililirubin test in the serum of light-exposed and non-light jaundice infants. The sampling technique used *consecutive sampling* technique and was examined using the *Dichlorophenyl diazonium* method. The tools used in the study were syringes, alcohol swabs, vacutainer tubes, centrifuge, micropipette, blue tip, yellow tip, sample cups, labels, EMP-A8020 tools. Direct bilirubin reagent, total bilirubin reagent, and serum.

Data was collected in descriptive form the differences in direct and indirect bilirubin levels in light-exposed and non-light icteric sera collected and presented in an analytical form. The initial step of data analysis was processed using the statistical test for normality of the *One Sample Kolmogorov-Smirnov* Test also obtained normal distribution results then continued with the *Paired T-test*.

## RESULT AND DISCUSSION

Serum samples of jaundiced infants was tested for bilirubin levels exposed to light and not exposed to light. The number of samples used in this study were 30 samples. **Table 1** shows the results that the total and direct bilirubin levels in serum of jaundiced infants who are exposed to light are lower than those who are not exposed to light, this is because light can reduce bilirubin levels (Kee, 2007).

**Table 1. Average total bilirubin and direct bilirubin levels**

	Laboratory Test	
	Total Bilirubin Levels	Direct Bilirubin Levels
Exposed to light	8,58	3,98
Not Exposed to light	12,67	8,71

Reference values: Total Bilirubin 0.3 - 1.0 and Bilirubin Direct 0.1 - 0.3 mg / dl

Laboraty testing of total and direct bilirubin levels in the serum of jaundiced babies with and without exposure to light has a significant difference, this is because there are several factors that affect serum stability, including internal and external factors or a combination of both. This causes the average bilirubin level to be unstable, if the bilirubin level is not controlled it will cause kernicterus, persistent neurological effects and even death in neonates (Widya, 2012; Umy, 2011).

One of the external factors that can reduce the total and direct bilirubin levels in the serum of jaundiced babies is due to light exposure. This mechanism occurs when the incoming light changes the energy in the form of heat which will have an effect on pyrrole 2 and 3 where the propionate group has an aldehyde (ketones are molecules in water where water is obtained from hydrogen bonds obtained from the propionate group, and the bilirubin group contains 2 propionate groups that have an O mean that are close to each other so that the presence of water caused by hydrogen bonding causes hydrogen bonds to decrease when exposed to light. This reaction is also used in phototherapy of yellow babies (Nadiyah, 2013).

Elevated levels of Total and Direct Bilirubin indicate a disturbance in the liver (liver cell damage) or bile ducts (stones or tumors), obstructive jaundice due to stones or neoplasms, hepatitis, Wilson's disease, or drug adherence. Meanwhile, a decrease in total and direct bilirubin levels can occur due to the influence of barbiturates, salicylates (aspirin), penicillin, caffeine in high doses. Or other factors that can affect bilirubin results are exposure to light, storage temperature and serum icteric (Widya, 2012).

Research conducted by Evi Muktiati (2015) states that infant Bilirubin levels after phototherapy have decreased, this is closely related to the results of this study where the Total and Direct Bilirubin levels

in the serum of icteric babies who are exposed to light and those who are not exposed to light also experience a decrease.

The mean value of serum levels of jaundiced babies on total and direct bilirubin examination exposed to light decreased in value, based on the *Kolmogorov-Smirnov One Sample Normality* test, a normal distribution was obtained with a value of  $p = 0.983 > 0.05$  then the *Paired Samples Test* was carried out. shows  $p = 0.00 < 0.05$ , the result is that there is a significant difference in total bilirubin levels exposed to light and not exposed to light, indicating that the result is  $p = 0.00 < 0.05$ , this indicates that  $H_0$  is rejected, then the result is that there is a significant difference in the total serum bilirubin levels of icteric babies exposed to light and not exposed to light.

## CONCLUSSION

The conclusion is that there is a decrease in total and direct bilirubin levels exposed to light compared to those not exposed to light, so total and direct bilirubin test should be done immediately and avoid exposure to light because they can affect the results of the study.

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