

Role of albumin concentration on the level of bilirubin in the neonatal jaundice

Akeel. A. AL.Kafagi*

Nasma. AL.Hujia*

*College of Medicine / University of AL-Qadisiya

e-mail: akeelkhafage@yahoo.com

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الخلاصة

يحدث اليرقان الولادي في معظم حديثي الولادة وكثير من هذه الحالات تعتبر تغيرات فسيولوجية لكن بسبب التأثير الضار للبلوروبين على حديثي الولادة يجب مراقبه وتحديد هؤلاء الذين قد يصابون بزيادة كبيرة في نسبة البلوروبين والتي قد تؤدي في بعض الحالات الخطره الى ضرر على الجهاز العصبي. هنالك عوامل كثيرة قد تساهم في حدوث هذه النتيجة الخطره. منها هو نسبة تركيز الالبومين في الدم. الغرض من هذه الدراسة هو تحديد العلاقة بين تركيز الالبومين ونسبة البلوروبين في الدم.

تشير النتائج النهائية الى انه لا يوجد تغير معنوي في مستويات البلوروبين عند مقارنتها بنسبة الالبومين في الدم. ولكن تبقى قياس نسبة تركيز البلوروبين الكلي الى الالبومين عامل مهم في التشخيص المبكر لليرقان الولادي وفي منع ومعالجه الزيادة الكبيره لنسبة البلوروبين وتأثيراتها الضاره على الجهاز العصبي.

Abstract

Jaundice occurs in most newborn infants. Most jaundice is benign, but because of the potential toxicity of bilirubin, newborn infants must be monitored to identify those who might develop severe hyperbilirubinemia and, in rare cases, acute bilirubin encephalopathy or kernicterus. Many factors may contribute to this unwanted outcome amongst this is the concentration of albumin.

The focus of this guideline is to determine the relationship between the level of serum bilirubin and the concentration of the albumin in neonatal jaundice.

The result revealed no significant changes was observed for the albumin concentration on the level of bilirubin.

Introduction

Bilirubin is potentially toxic product of heme catabolism that is normally cleared from plasma by liver conjugated with glucouronic acid and excreted into bile. Increased production of bilirubin (like infant with blood group and Rh incompatibilities), deficiencies of hepatic uptake, impaired conjugation of bilirubin and increased entero hepatic circulation of bilirubin account for most cases of pathological jaundice in newborn infant (1).

The primary concern with respect to the exaggerated hyper bilirubinemia is the potential neurotoxic effect on the central nervous system. Many factors may influence the neurotoxic effect of

bilirubin involved hypoxia, acidosis, gestational age and the concentration of bilirubin in the brain, the duration of exposure and the concentration of albumin bound bilirubin(2).

Bilirubin can enter the brain if it is not bound to albumin or it is unconjugated, therefore if the serum albumin concentration is low the binding of bilirubin is compromised and the free bilirubin increase, prone the neonate for the risk of encephalopathy (3).

The objective of this study is to determine the relationship between serum concentrations of albumin and the intensity of bilirubin.

Result

A sample were taken from 40 neonates who were admitted to the neonatal care unit in the hospital that treated for neonatal jaundice with phototherapy and or exchange transfusion. Another sample was taken from 60 neonates who visit the out patient clinic for checking for neonatal jaundice.

Comparison estimate using t test was made between two groups of patients, group (1) who revealed total serum bilirubin concentration below 15 mg\dl and group (2) who express the level of total serum bilirubin concentration above 15 mg\dl, in relation to the level of serum albumin concentration. table(1)

Table -1-

	Mean of bilirubin concentration(mg\dl) \pm SD	Mean of albumin concentration(g\dl) \pm SD
Group 1	11.1 \pm 0.50	0.56 \pm 0.56
Group 11	16.2 \pm 0.60	0.38 \pm 0.38

The result revealed no significant changes was observed between two groups , yet the level of albumin

concentration still have variable figure in the group(2) than in group(1)

Discussion

In fact hyperbilirubinemia and subsequent neurotoxic effect of bilirubin on the brain is determined by many factors among these are hypoxia, acidosis, gestational age, the concentration of bilirubin in the brain, the duration of exposure and the concentra -tion of albumin bound bilirubin(4).

Bilirubin can enter the brain if it is not bound to albumin or if it is unconjugated. Albumin can bind bilirubin at nearby a ratio of up to 1 or maximamum 8.2 mg bilirubin per gram of albumin. Therefore newborn infant with serum albumin concentration of 3 gm \dl may have serum concentration of albumin bound bilirubin of approximately 25mg\dl (5). So if the serum albumin concentration is low the binding compromised and the risk of kernicterus is increased. Hence albumin binding is thought to be a crucial determined of bilirubin clearance in health and bilirubin toxicity in certain disease state (6).

Actually this kind of binding between albumin and bilirubin is affected by many factors which in turn may alter the concentration for both the albumin and the free bilirubin, like PH of the blood,

drugs and hormones that may compete with bilirubin for its active binding site on albumin (7).

Some studies found that elimination of bilirubin can increase, if infusion of salt free albumin at a dose of 1 gm per kilogram one to four before exchange transfusion increases the mean amount of bilirubin removed from 8.7 to 12.3 mg per kilogram of birth weight, thus demonstrate the importance of albumin binding bilirubin(8).

Furthermore researchers found that longer green wave length penetrate the skin more deeply and may interact more effectively with albumin bound bilirubin and consequently reduce hyperbilirubinemia more efficiently(9).

The American academy of pediatric recommended the use of total bilirubin concentration over albumin ratio (TBC\A) in addition to the total bilirubin concentration in the management of neonatal jaundice. Although they thought that the ratio is a rough measure of bilirubin binding albumin and has not been widely used clinically. Clinician are encourage to measure the albumin level along with total bilirubin concentration, however a lower than expected albumin concentration at least alert the physician

to the possible need for intervention at lower than usual total bilirubin concentration(10).

Although in our study there was no variation in the level of bilirubin in regard to albumin concentration, but still is more helpful to consider the albumin

concentration it self on practical bilirubin binding capacity and use TBC\A ratio as further guide line for early detection of high risk group of neonate and in prevention and management of hyperbilirubinemia.

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