

Serum Unbound Bilirubin Versus Transcutaneous Bilirubin in Jaundiced Term Neonates

M.A.ELBISHRY, A.E.Elsadek, E.G.Behiry and M.A.Hasan
Pediatrics Dept., Faculty of Medicine, Benha Univ., Benha, Egypt
E-Mail: Mona.mansour10489@yahoo.co

Abstract

Transcutaneous bilirubin (TcB) consists of the skin-deposited bilirubin. Free bilirubin speaks to the protein-unbound bilirubin (UB) that can go into the tissues. We expected to portray the connection between UB-TcB and study the section of UB into the skin. We tentatively enlisted 40 neonates and we estimated TcB, UB and all out serum bilirubin. Different locales TcB estimation was performed. TcB has a comparative relationship with UB and TSB. There is a significant relationship with TSB, DSB (direct serum bilirubin) between embittered term neonates when contrasted with solid term neonates. There is a critical relationship between free bilirubin in embittered term neonates when contrasted with solid term. TcB test doesn't appear to straightforwardly supplant UB estimation. Be that as it may, TcB and UB are connected, UB adds to the skin bilirubin statement yet it isn't the main bilirubin species estimated by transcutaneous bilirubinometry.

Keywords: Neonate, Transcutaneous bilirubin, Unbound bilirubin, Jaundice.

1. Introduction

The American Academy of Pediatrics (AAP) suggests hour-explicit assessment of either transcutaneous bilirubin (TcB) or all out serum bilirubin (TSB) to screen neonatal jaundice at the same time, with regards to restorative choices, clinicians are encouraged to consider TSB values [1].

Bilirubin is a yellow color got from heme catabolism in the reticuloendothelial framework and exists in the blood for the most part bound to egg whites. Expanded creation of bilirubin is because of expanded breakdown of erythrocytes containing fetal Hgb, insufficient erythropoiesis, alongside diminished conjugation because of youthfulness of liver catalysts, just as a one of a kind neonatal wonder of enterohepatic distribution of bilirubin during the principal seven day stretch of life [8].

The portion of unbound bilirubin, otherwise called free bilirubin or non-egg whites bound UCB increments essentially as the TSB approaches the coupling limit of egg whites (1 g of egg whites ties to 8 mg of bilirubin, ~1:1 on a molar premise) Important determinants of neurologic injury by bilirubin are grouping of unbound UCB, convergence of serum egg whites, bilirubin authoritative by egg whites, centralization of hydrogen particles, blood-cerebrum obstruction penetrability, neuronal powerlessness and focal sensory system youthfulness auxiliary to rashness [10] just as the term and level of hyperbilirubinemia [11]. Depending on these related hazard factors, neurotoxic impacts might be transient or perpetual [8].

Free UCB which is lipid solvent crosses the blood-cerebrum hindrance and influences the plasma films and mitochondria of the neurons, microglial cells, and astrocytes,

bringing about [3] microglial and astrocyte actuation, disabled myelination, and neuronal demise [9].

Transcutaneous bilirubinometers basically measure the extravascular bilirubin that has gone into the skin. Consequently, TcB would speak to a segment of bilirubin that is not any more circling yet that rather is collecting into a tissue. The bilirubin entry into the skin is conversely identified with plasma restricting enthusiasm (PBA) that increments with expanding circling egg whites and its natural capacity to tie bilirubin, which is spoken to by the bilirubin-egg whites mass activity balance steady (K). As PBA expands, a more prominent measure of bilirubin will stay into the course and, on the other hand, the extravascular bilirubin will be less [7].

2. Subjects and methods

In this descriptive cross-sectional study, 40 term (>37 gestational weeks) neonates weighing ≥ 2500 g was conducted on patients attending Neonatal Intensive Care Units (NICUs) of the Pediatric Department, Benha University Hospital.

2.1 Subjects

This study was conducted on 40 patients admitted with different clinical problems.

Group (I) : Included 20 neonates with unconjugated hyperbilirubinemia, Gestational age >37 weeks, no previous phototherapy, exchange-transfusion, albumin or immunoglobulin administration, treated in the neonatal intensive care unit.

2.2 Exclusion criteria

Premature neonates, those less than 2500 g, or neonates suspected of septicemia,

meningitis, and cholestasis or evidence of any neonatal liver disease.

Group (II) : Included 20 healthy term neonates as control group.

2.3 Methods

2.3.1 Data collection

- Data were collected by physician on a standardized form
- All neonates incorporated in this study were subjected to the following:

A) Careful complete history taking

Neonatal data were also collected including: age , sex , birth weight , current weight , height , onset of jaundice , birth order in the family, history of jaundice in the family , type of delivery , type of feeding , history of hospitalization , neonatal and maternal blood group , history of phototherapy and history of blood transfusion in newborn.

B) Full clinical examination

General examination: (Vital signs, birth trauma, neonatal reflexes, and congenital anomalies). Systemic examination: (Cardiac examination, Abdominal examination Chest examination and Neurological examination.

C) The following laboratory investigations were done:

- 1- TSB (total serum bilirubin).
- 2- UCB free (free unconjugated bilirubin).

Neonates who appear to be icteric outwardly were analyzed by a pediatric inhabitant and in the event that they had the incorporation models for the investigation, their bilirubin levels were estimated multiple times on the temple for keeping away from any predisposition actuated by the bilirubinometer (JH20-1, Japan). Cutaneous bilirubin was estimated by a pediatric inhabitant. The skin was whitened because of the weight when the mechanical assembly is put on the skin and afterward the bilirubin was estimated by utilizing light waves in various manners. The

transmitted light goes to sub-cutaneous layer through the skin and reflected. In light of the reflected wave details, the cutaneous bilirubin is determined.

The mean levels were recorded and blood tests were gotten inside 30 minutes and sent to the research facility for deciding TSB, DSB and UCB. Testing was performed from brachial vein of neonates. TSB was estimated utilizing a bilirubinometer (Model BR-5000N, Japan). The two estimations got from the two techniques were then analyzed.

2.4 Statistical analysis

Data were analyzed using SPSS software, version 16. Independent t test (to compare the quantitative variable in the two studied groups) and Pearson's correlation coefficient (to evaluate effective parameter on dependent variable) were used accordingly.

3. Results

Mean age of studied jaundiced term cases was 37.9 hours, while mean age of healthy term group was 39.8 hours. All studied jaundiced term cases were 12.8 males (64%), 7.2 females (36%); healthy term group were 13.8 males (69%), 6.2 females (31%). No significant differences were found in age and gender between both groups Table (1).

Mean birth weight was 3 Kg, ranged from 2.8 to 3.6 Kg. Mean gestational age was 38.3 weeks, ranged from 38 to 40 weeks. Jaundiced neonates were significantly associated with younger GA, while birth weight did not differ significantly between both groups Table (2).

Jaundiced term neonates were significantly associated with TSB, DSB when compared to healthy term neonates Table (3).

Jaundiced term neonates showed significantly higher free bilirubin (mean = 0.51 ug/dL) when compared to healthy term (mean = 0.29 ug/dL), (p=0.022) Table (4).

Table (1) Comparison of age and gender between studied groups.

		Healthy term N=20		Jaundiced term N=20		P
Age (hours)	mean±SD	39.8±11.8		37.8±10.2		0.411 ^t
	Range	11-74		13-74		
Males	N, %	13.8	69	12.8	64	0.339 ^c
Females	N, %	6.2	31	7.2	36	

SD, standard deviation; t, t student test; c, chi square.

Table (2) Comparison of birth weight and gestational age between studied groups.

	Healthy term N=20		Jaundiced term N=20		P
	Mean	SD	Mean	SD	

Birth weight (kg)	3	0.7	3	0.7	0.321 [†]
Gestational age (week)	38.3	1.7	37.3	1.3	0.002 [†]

†, t student test

Table (3) Comparison of bilirubin measures among studied groups.

	Healthy term N=20		Jaundiced term N=20		p
	Mean	SD	Mean	SD	
TSB (mg/dL)	1.9	0.4	7.4	2.9	<0.002t
DSB (mg/dL)	0.39	0.2	0.47	0.2	0.006t

†, t student test

Table (4) Comparison of free bilirubin between studied groups.

Free (ug/dL)	Bilirubin	Mean±SD Range	Healthy term N=20	Jaundiced term N=20	p
			0.29±0.07 0.15-0.69	0.51±0.58 0.26-3.3	

4.

5. Discussion

In the current investigation which done on 40 term jaundiced(37 gestational weeks) neonates gauging ≥ 2500 g was directed on patients going to Neonatal Intensive Care Units (NICUs) of the Pediatric Department, Benha University Hospital.

We examined the connection between depict UB and TcB and study the section of UB into the skin

We found that, : TcB has a comparative connection with UB and TSB. There is asignificant relationship with TSB, DSB(direct serum bilirubin) between embittered term neonates when contrasted with sound term neonates. There is a critical relationship between free bilirubin in embittered term neonates when contrasted with sound term.

By looking into comparative reports, [2] detailed that, a high relationship among's TCB and TSB estimations in neonates which is like our examination.

Douville and associates additionally found a phenomenal relationship among's TCB and TSB in term neonates [4] Which is like our investigation.

[5]detailed that TcB furnished great concurrence with research facility assurance of TSB with connection coefficient $r \geq 0.90$ in a basically Caucasian populace. Our current examination additionally indicated great relationship among's TcB and TSB values.

[5]found that, Jaundiced neonates were fundamentally connected with more youthful GA, while birth weight didn't vary essentially between both groups. which is like our examination .

Wong and Stevenson likewise discovered that, Jaundiced term neonates demonstrated essentially higher free bilirubin when contrasted with solid term [12]. which is like our examination.

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