ISSN NO: 2770-2936
Date of Publication:08-06-2022

Neonatal Jaundice: Lines of Management in Children's Hospital at Kirkuk city, Iraq

Sayran Atallah Faiq [1], May Mohammed Sheriff [2]
[1] M.B.Ch.B. F.I.B.M.S IN Pediatrics. Senior house officer at children's hospital Kirkuk
[2] M.B.Ch.B. HD. Medicine Pediatric. Kirkuk Health Directorate, Iraq

Abstract
Background: Jaundice is observed in first week of life in 60% of term & 80% of preterm infants, it is usually benign, but untreated, severe indirect hyperbilirubinemia is potentially toxic to nervous system of neonate.
Aim of the study: Identify the factors affecting the lines of management of neonatal jaundice.
Patients &Methods: this cross sectional study was carried out at neonatal intensive care unit (NICU) of Children's Hospital in the City of Kirkuk, Iraq; from May 2020 to November 2020.Data were collected from228 admission records. The age of patients were 1 day to 28 days.
Results: from 228 neonate ,166(72%) had neonatal jaundice,128(77.1%)were term ,38(22.8%) were preterm, the factors studied were (level of total serum bilirubin TSB ,term ,preterm ,age of neonate ,& weight) with lines of management used in NICU (phototherapy ,antibiotics ,combined phototherapy with antibiotics ,& exchange transfusion).There was a significant association between these factors & the lines of management applied .
Conclusion: level of serum bilirubin is the most important factor in the management and the study showed a significant association between level of serum bilirubin and the other factors studied with the lines of management
Recommendation: Educating families about early recognition of jaundice &seeking medical advice is important to avoid invasive procedures like exchange transfusion and it is be better to start phototherapy earlier &at lower TSB level in low birth weight babies

Key words: Jaundice; TSB; Term; Preterm; phototherapy.

Introduction:
Hyperbilirubinemia is a common &, in most cases, benign problem in neonates. Nonetheless, untreated, severe indirect hyperbilirubinemia is potentially neurotoxic, & conjugated direct hyperbilirubinemia often signifies a serious hepatic or systemic illness. Jaundice observed during the first week of life in approximately 60% of term infants& 80% of preterm infants. The color usually result $_2$ om the accumulation in skin of unconjugated ,no polar, lipid-soluble bilirubin pigment(indirect reacting) Severe neonatal jaundice can cause serious permanent side effect called "kernicterus", in which the brain stem nuclei & basal ganglia are damaged. Its clinical features include lethargy, hypotonic, convulsion, opisthotonos, & mental delay. (2-4). Unconjugated bilirubin bind to albumin on specific binding site: 1 gram of albumin binds to 8.5 mg of bilirubin. Organic acid such as free fatty acid & drugs such as sulfisoxasole can displace bilirubin from its binding sites on albumin . The specific bilirubin binding capacity of albumin was found to be greater for infants whose birth weight exceed 2000gm for the lower birth weight group.(3,4,5). Aim of the study was to identify the factors affecting the lines of management of neonatal jaundice.

Patients and Methods: a cross sectional study was carried out at neonatal intensive care unit(NICU) of children's hospital ,in the city of Kirkuk ,Iraq .By reviewing 228 admission records to neonatal intensive care unit from May 2020 to November 2020 data Consisting of measurement of total serum bilirubin TSB in mmol/L with weight , age, either term or preterm , were collected then computed using Microsoft Excel Office. The t test, & Chi-square test were used. A p-value equal & less than 0.05 was considered significant.

ISSN NO: 2770-2936
Date of Publication:08-06-2022

Results:

From 228 admissions to NICU ,166(72.8%)had neonatal jaundice . Of these jaundiced neonates128(77.1%)were term and 38(22.8%) preterm. Table 1shows type of therapy versus TSB level in mmol/L in term neonates.34.3% of them received phototherapy alone , 31.2% of term neonates received phototherapy & antibiotics , 23.4% neonates had exchange transfusion as treatment for their jaundice ,and 10.9% of term babies were treated by antibiotics only. P=0.001 (Table 1)

Table 1,, The distribution of TSB level in mmol/L with each type of therapy in term neonates

type of therapy	**TSB (100-200)mmol/L**	TSB(201-300) **mmol/L**	TSB(301-400) **mmol/L**	TSB(401-500) **mmol/L**	TOTAL No.	%
photo & antibiotics	10	22	8	0	40	31.250
antibiotic	13	1	0	0	14	10.938
phototherapy	9	32	2	1	44	34.375
exchange transfusion	1	5	13	11	30	23.438
TOTAL	33	60	23	12	128	100%

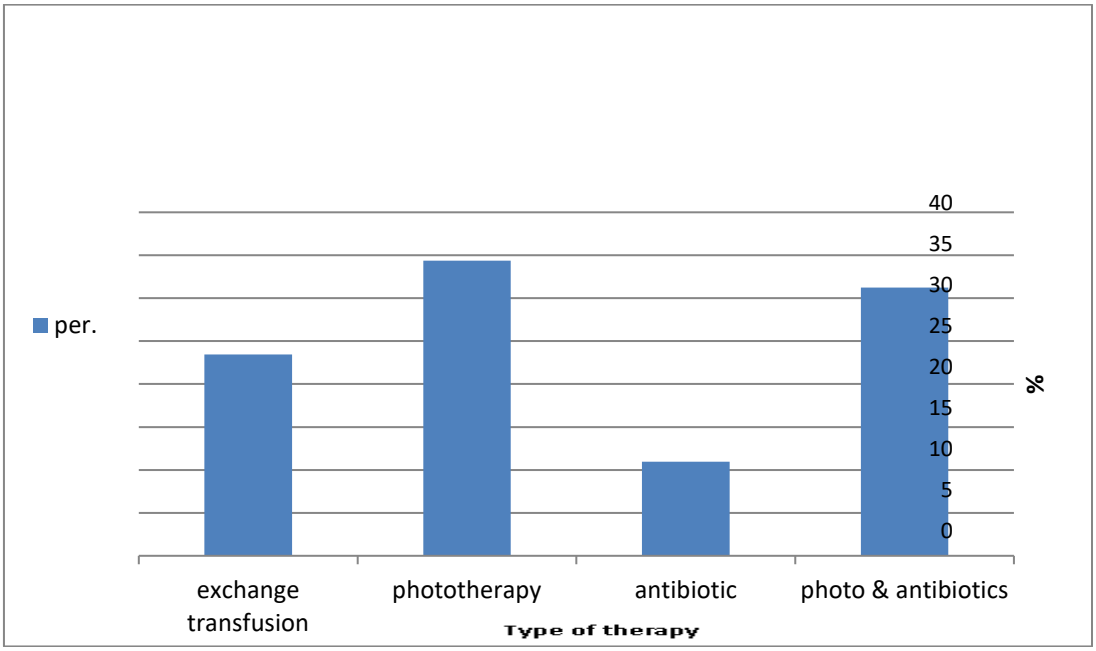

Figure 1: Percentage of each type of therapy in term neonates

Table 2 shows type of therapy versus TSB level in preterm neonates.52.6%of preterm received phototherapy & antibiotics, 18.4% received antibiotics alone ,13% of preterm received phototherapy alone ,15% of preterm had exchange transfusion, P=0.002.

Table 2,, The distribution of TSB measured in mmol/L with each type of therapy in preterm neonates

type of therapy	**TSB (100-200)mmol/L**	TSB(201-300) **mmol/L**	TSB(301-400) **mmol/L**	TSB(401-500) **mmol/L**	TOTAL No.	%
photo &antibiotics	10	8	2	0	20	52.632

ISSN NO: 2770-2936
Date of Publication:08-06-2022

antibiotic	7	0	0	0	7	18.421
phototherapy	2	2	1	0	5	13.158
exchange transfusion	0	0	5	1	6	15.789
TOTAL	19	10	8	1	38	100%

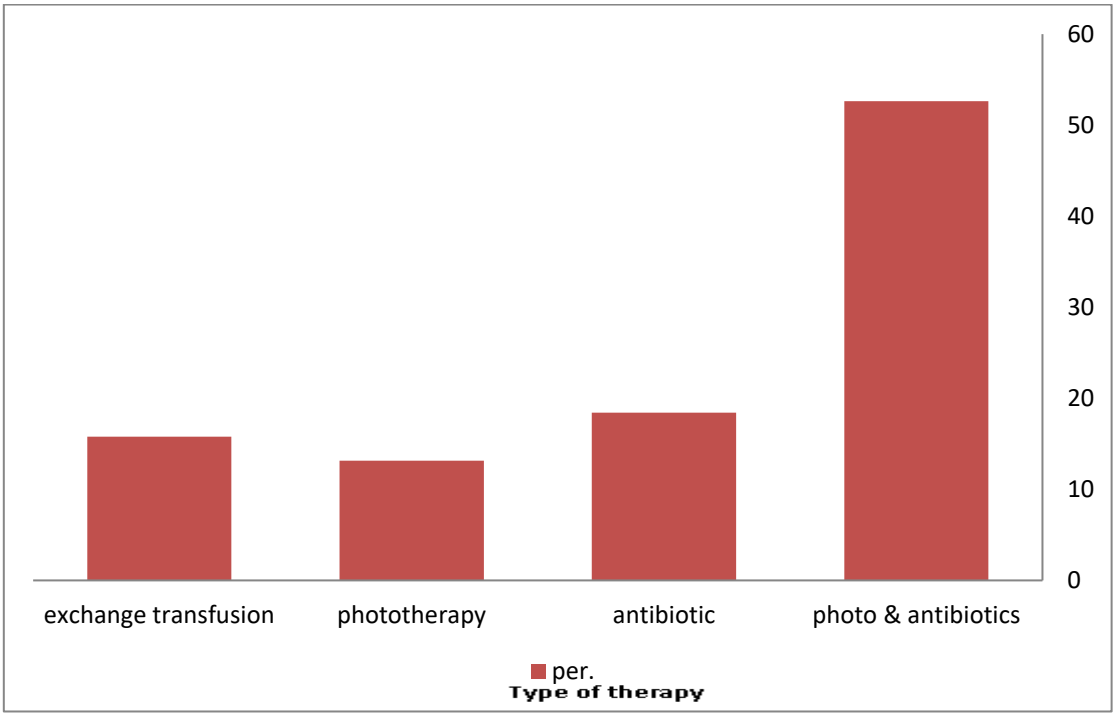

Figure 2: Percentage of each type of therapy in preterm neonates

Table 3 shows type of therapy versus TSB level in neonates 2.5 kg &less) .48.9 %of them received phototherapy & antibiotics ,14.8 % of them treated with antibiotics only ,21.2% of them treated by phototherapy only , 14.9%of them had exchange transfusion , P=0.001.

Table 3,, The distribution of TSB measured in mmol/L with each type of therapy in neonates with weight (2.5kg&less)

type of therapy	**TSB (100-200) mmol/L**	TSB(201-300) **mmol/L**	TSB(301-400) **mmol/L**	TSB(401-500) **mmol/L**	TOTAL No.	%
photo & antibiotics	12	10	1	0	23	48.936
antibiotics	7	0	0	0	7	14.894
phototherapy	4	5	1	0	10	21.277
exchange transfusion	0	2	5	0	7	14.894
TOTAL	23	17	7	0	47	100%

ISSN NO: 2770-2936
Date of Publication:08-06-2022

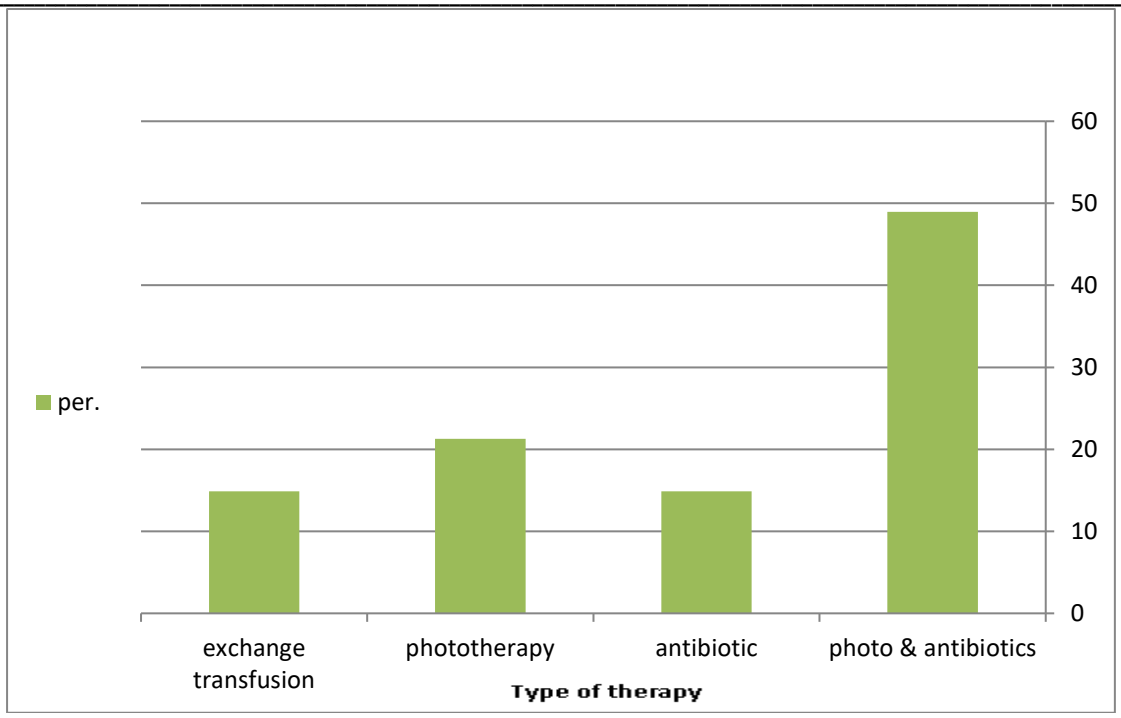

Figure 3: Percentage of each type of therapy in neonates with weight (2.5kg & less)

Table 4 shows type of therapy versus TSB level in neonates weight more than2.5kg ,31%of them treated by phototherapy &antibiotics ,11.7% of them treated by antibiotics only , 32.7% of them treated by phototherapy only ,&24.3% of them had exchange transfusion, P=0.001.

Table 4: The distribution of TSB measured in mmol/L with each type of therapy in neonates with weight more than 2.5Kg .

type of therapy	TSB(100-200) **mmol/L**	TSB(201-300) **mmol/L**	TSB(301-400) **mmol/L**	TSB(401-500) **mmol/L**	TOTAL No.	%
photo &antibitics	8	20	9	0	37	31.092
antibiotics	13	1	0	0	14	11.765
phototherapy	7	29	2	1	39	32.773
exchange transfusion	1	3	13	12	29	24.370
TOTAL	29	53	24	13	119	100%

ISSN NO: 2770-2936
Date of Publication:08-06-2022

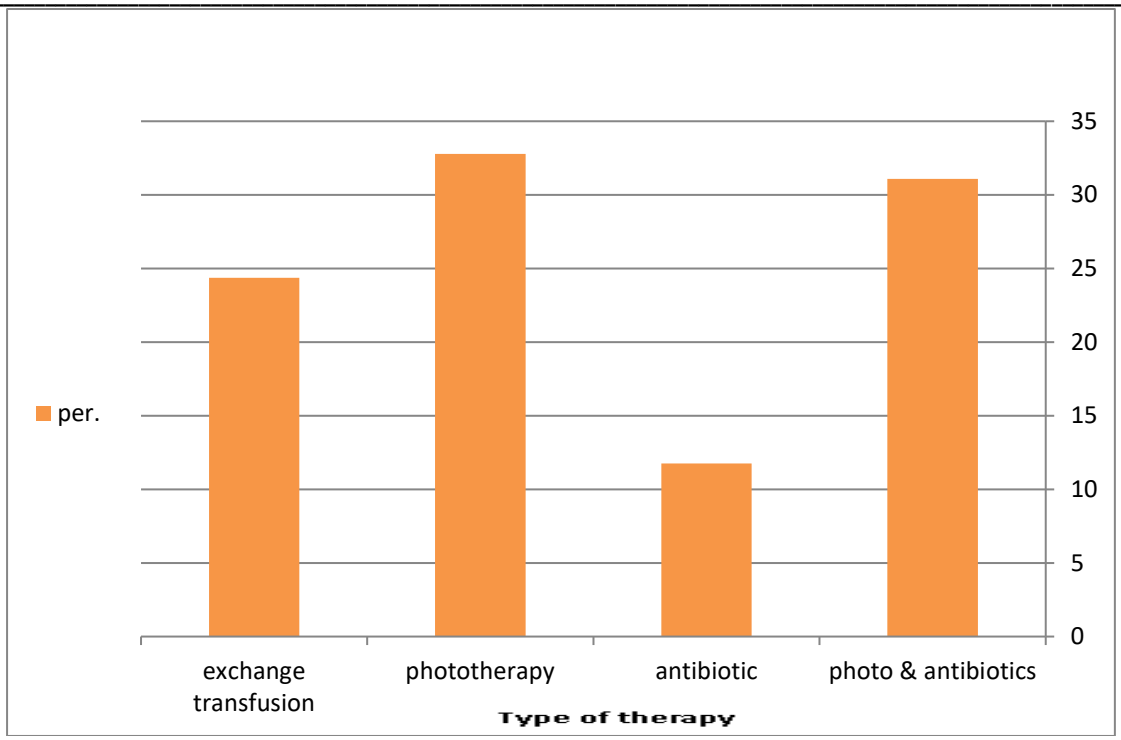

Figure 4: Percentage of each type of therapy in neonates with weight more than 2.5 Kg

Table 5shows age in days versus TSB level in mmol/L , P=0.001.

Table 5 the distribution of TSB measured in mmol/L with age of neonates .

Age	TSB(100-200) **mmol/L**	TSB(201-300) **mmol/L**	TSB(301-400) **mmol/L**	TSB(401-500) **mmol/L**	TOTAL No.	%
1Day-3Day	24	9	5	3	41	24.699
4Day-6Day	11	30	12	6	59	35.542
7Day-9Day	8	25	9	3	45	27.108
10Day-28Day	9	6	5	1	21	12.651
TOTAL	52	70	31	13	166	100

ISSN NO: 2770-2936
Date of Publication:08-06-2022

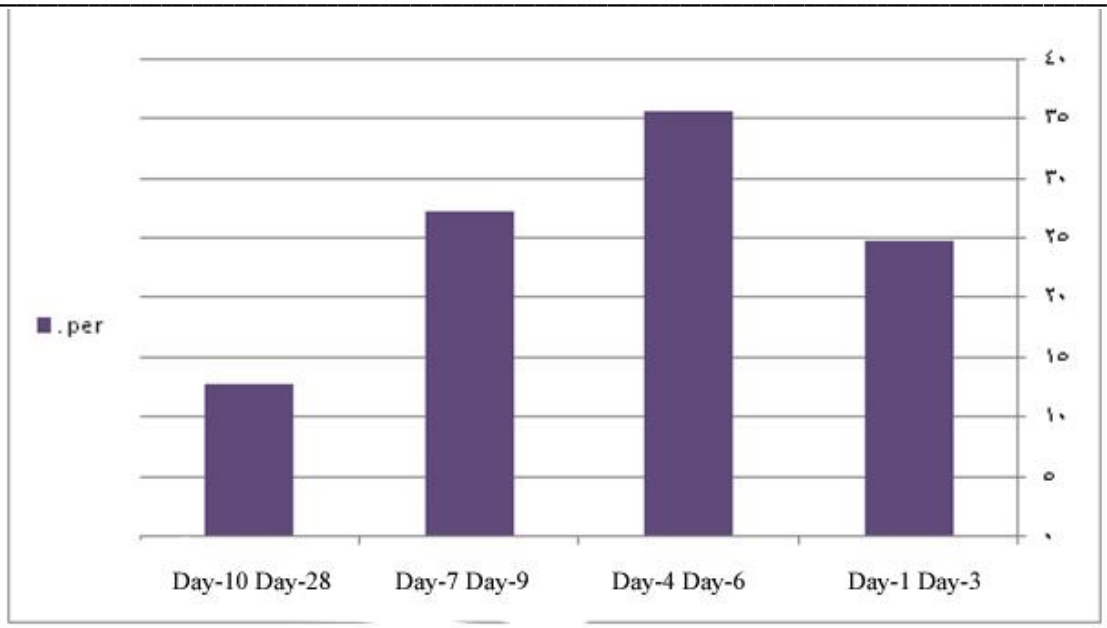

Figure 5: Percentage of patients according to age group

Discussion:

Treatment of hyperbilirubinemia can be done via , first :exchange transfusion to remove bilirubin mechanically ; second :phototherapy to convert bilirubin to products that can bypass the liver conjugating system & be excreted in the bile or in the urine without further metabolism; third: pharmacologic agents to interfere with heme degradation& bilirubin production, accelerate the normal metabolic pathways for bilirubin clearance, or inhibit the enterohepatic circulation of bilirubin.(6,7,8). Exchange transfusion of blood via an umbilical vein is the most efficient way of removing bilirubin & other noxious substances .It is employed when bilirubin levels reach the toxic range determined both by gestational age & the clinical state of the baby . Sicker babies with their attendant metabolic derangements such as acidosis are transfused at lower levels. Acceptable criteria for exchange transfusion would be a serum bilirubin of 340mmol/L in term babies , 300mmol/L(infants less than 2.5kg) , 250mmol/L in infants <1.5kg) & 170mmol/L infants <1kg . (4,5,9,10). Phototherapy :works by infusing discrete photons of energy similar to the molecules of a drug. These photons are absorbed by bilirubin molecules in the skin & subcutaneous tissue ,just as a drug molecule bind to a receptor. The bilirubin then undergoes photochemical reactions to form execrable isomers & breakdown products that can bypass the liver's conjugating system & be excreted without further metabolism .Some photo products also are excreted in the urine. There are factors that affect the dose& efficacy of phototherapy, including type of light source ,the infants distance from the light ,& the surface area exposed .Because of the optical properties of bilirubin & skin ,the most effective lights are those that have wave lengths predominantly in the blue-green spectrum(425-490 nm).At these wavelengths , light penetrates the skin well & is absorbed maximally by bilirubin.(11,12) This was supported by a study done by Ennever et al (13). Phototherapy must be started early enough to prevent the expected rise in bilirubin but not at a level which causes unnecessary work for the nursing staff & more importantly an unnecessary separation of mother &baby .Where a rapidly rising bilirubin is expected such as hemolytic disease & jaundice at less than 24 hour ,phototherapy should be started straight away & the sequential bilirubin results should graphed. As a general rule the more premature the infant the lower the level of bilirubin that are tolerated .(7) This study shows that antibiotics with phototherapy was used in 52% of Preterm babies & 48% of neonate with weight Less than 2.5 kg . This is supported by the Fact that preterm infants have a(3 to 10) fold higher incidence of infection than full term , normal birth weight infants do . (1,8). One of the complications of phototherapy ; is dehydration as a result of increased insensible water loss through the skin & increased stool water content increasing the fluid intake of infants under phototherapy by 15 ml/kg/day will correct this.(2,5,10). Regardless of the cause ,the goal of therapy is to prevent the concentration of

ISSN NO: 2770-2936
Date of Publication:08-06-2022

indirect –reacting bilirubin in the blood from reaching levels at which neurotoxicity may occur. Phototherapy is usually started at 50%-70%of the maximal indirect level. If values greatly exceed this level ,if phototherapy is unsuccessful in reducing the maximal bilirubin level ,or if signs of kernicterus are evident , exchange transfusion is indicated.(1)

Conclusion: Level of serum bilirubin is the most important factor deciding the line of management and there are significant associations between level of serum bilirubin with other factors affecting line of management (age and weight of newborn as well as being term or preterm baby).

Recommendation: Educating families about early recognition of jaundice &seeking medical advice is important to avoid invasive procedures like exchange transfusion and it is be better to start phototherapy earlier &at lower TSB level in low birth weight babies

References:

1. Stoll B J.Kliegman RM . Jaundice and hyperbilirubinemia in the newborn. In: Beherman RE,Kliegman RM ,Jensen HB ,eds.Nelson Textbook of Pediatrics .17th ed. WB Saunders Co :Philadelphia PA:2004:91:592-599.
2. Saeidi R. Heydarian F.,Fakehi V.,Role of intravenous extra fluid therapy in icteric neonates receiving phototherapy .Saudi Med J,2009;30:1176-1178.
3. Maisels MJ. Jaundice in the newborn .Pediatrics in Review.2006; 27:443-455.
4. Weinberg R P.Gastroenterology. I.Bilirubin physiology In:Roberton NRC.ed.Textbook of neonatology.London: Churchill Livingstone; 1986:383-393.
5. Amin SB. ,Lamola AA.,Newborn jaundice and bilirubin binding capacity in neonate, Semin Perinatol .2011;35(3):134-140.
6. Dennery PA.,Seidman DS., Stevenson DK. Neonatal hyper bilirubinemia . N Engl Med 2001:344:581-590 .
7. Maisels MJ.,Baltz RD ,Bhutani V,et al.Management of hyperbilirubinemia in the newborn infant 35or more weeks of gestation. Pediatrics.2004;114:297-316.
8. Watchko JF. hyperbilirubinemia and bilirubin toxicity in the late preterm infant. Clin Perinatol .2006 ;33(4):839-852.
9. Wang X.,RoyChowdhury J.,RoyChowdhury N.Bilirubin metabolism:Applied physiology.Curr Pediatr .2006;16:70-74.
10. XiangT.,Qu Y.,Cambiers S.,et al. The side effects of phototherapy for neonatal jaundice:what do we know?what should we do?.Eur J Pediatr .2011; 1:338-339.
11. Watchko JF. Neonatal hyperbilirubinemia –what are the risks? N Engl Med. 2006;354:1947-1949.
12. MacDongh AF., Palmer LA., Lightner DA. Phototherapy for neonatal jaundice. J Am Chem Soc.1982;104:6867.
13. Ennever JF.Blue light,green light,white light ,more light:treatment of neonatal jaundice.Clin Perinatol ,1990;17:467-481.