

Neonatal jaundice In Kirkuk pediatric hospital: epidemiological study and outcome

Ziad M. Sadiq .

Dept. of Clinical Sciences, College of Nursing, Kirkuk University

Abstract

Neonatal Jaundice is a common problem affecting over half of all full-term and most preterm infants. A retrospective study which reviewed all premature neonates whom admitted to the neonatal care unit of Kirkuk pediatric hospital from 1st January 2006 to 31st December 2006. Data regarding gestational age, birth weight, sex, peak serum bilirubin levels, mode of treatment, and associated conditions were collected and analyzed. The result of the study showed higher frequency of neonatal jaundice in females with (91.64% of total females VS. 80.5% of total males). Jaundice was more in premature infants (93%) than full term infants (86.16%). In most case the exact causes behind jaundice passed undiagnosed, identifiable causes include physiological jaundice (12.21%), sepsis (10.25), and blood group incompatibilities (6.61%). Exchange blood transfusion required in (16.75%) cases treatment, other neonates treated successfully by phototherapy.

Introduction

Neonatal Jaundice is a common problem affecting over half of all full-term and most preterm infants. Jaundice describes as the yellowish orange hue of the skin caused by excessive circulating levels of bilirubin that accumulate in the skin. In most healthy fullterm newborns, jaundice is noticed during the first week of life.⁽¹⁾

Neonatal jaundice may have first been described in a Chinese textbook 1000 years ago, medical theses, essays, and textbooks from the 18th and 19th centuries contain discussions about the causes and treatment of neonatal jaundice, and several of these texts also describe a lethal course in infants who probably had Rh isoimmunization. In 1875, Orth first described yellow staining of the brain, in a pattern later referred to as kernicterus.⁽²⁾

Alterations in the equilibrium between bilirubin production, conjugation, and excretion cause this transitional elevation during the neonatal period.⁽³⁾ The pathophysiology of this

condition may vary according to the etiology. Different clinical entities presenting with neonatal jaundice include physiological jaundice, blood group iso-immunization, immaturity, or genetic deficiency of enzyme systems among others, common clinical risk factors associated with neonatal jaundice include prematurity, low birth weight, neonatal sepsis, Asian race, bruising, previous sibling with a history of jaundice, breast feeding, epidural anesthesia, instrumental delivery, and oxytocin use during labor.⁽⁴⁾ Phototherapy is the primary treatment in neonates with unconjugated hyperbilirubinemia.

This therapeutic principle was discovered rather serendipitously in England in the 1950s and now is arguably the most widespread therapy of any kind (excluding prophylactic treatments) used in newborns (5). Exchange transfusion became the second-line treatment when phototherapy failed to control serum bilirubin levels. However, recent data have shown that

treatment with intravenous immune globulin (IVIG) in infants with Rh or ABO isoimmunization can significantly reduce the need for exchange (5)

This aim of this study is to gives an idea about the most important epidemiological aspect of neonatal jaundice, effectiveness of the therapy, and most frequent identifiable causes of this problem in Kirkuk pediatric hospital.

Patients and Methods

Retrospective study was done in neonatal unit of Kirkuk pediatric hospital. All jaundiced infants admitted to the neonatal unit from 1st January 2006 to 31st December 2006 were included in the study. Data included gestational age (GA), birth weight (BW), sex, peak serum Bilirubin levels, mode of treatment, and associated conditions were collected from the hospital records. Statistical analysis was carried out to assess the deference between the results by applying chi square, statistically significant value was defined as ($p < 0.05$).

Results

A total of 712 jaundiced neonates have been collected and analyzed. Regarding the sex deference, it has been found that neonatal jaundice is more common in female (91.64% of total female admitted to neonatal unit) than in male (80.5% of total male admitted to the neonatal unit). This deference was statistically significant ($p < 0.05$), as shown in table (1).

It's also found that neonatal jaundice is more common in premature neonates (93%) than fullterm infants (86.16%). This deference between the two groups was statistically significant ($p < 0.05$). As shown in table (2). In most cases the exact causes behind elevation of the serum bilirubin

passed undiagnosed, however, 87 jaundiced neonates (12.21%) were have the criteria of physiological jaundice. Sepsis was the next common cause, proved by blood culture in 73 jaundiced neonates (10.25%), other causes of neonatal jaundice shown in table (3).

Regarding the treatment, most of the cases were successfully treated by phototherapy (83.15%), while remaining neonates (16.25%) required exchange transfusion of blood to prevent development of bilirubin encephalopathy, table (4).

Discussion

Neonatal jaundice is common in neonates, especially in Orientals. The prevalence of neonatal jaundice is 50% to 60% in term and 80% in preterm neonates.⁽⁷⁾ Neonatal hyperbilirubinemia can lead to sensorineural hearing impairment, cerebral palsy, psychologic impairment, disturbances in visual perception, or gaze paralysis.⁽⁸⁾

In most healthy full-term newborns, jaundice is noticed during the first week of life and becomes noticeable at a bilirubin level of 5 mg/dl. Although uncommon, bilirubin toxicity occurs at bilirubin levels greater than 17 with possible long-term effects on brain cells.⁽¹⁾

In this study there is statically significant deference in the frequency of jaundice between males and females, with higher rate in females, this result is similar to a study done and approved by the Institutional Review Board at the George Washington University Hospital that showed significant deference between males and females with females' predominance. The role that various gender-biased biologic mechanisms contribute to the observed male disadvantage can only be speculated. Dysfunction of the placenta can be a factor, as described in association with male fetus pregnancies.⁽⁹⁾ In addition, a higher

metabolic rate in the male fetuses may be another contributing factor. This theory is enforced by the fact that XY blastocysts and embryos grow at an accelerated rate when compared with XX chromosome bearers.⁽¹⁰⁾

Statistically significant deference in the frequency of jaundice also found between fullterm and premature infants, with premature newborn predominance. The risk of significant neonatal jaundice is inversely proportional with gestational age. Premature infant frequently have poor enteral intake, delayed stooling, and increased enterohepatic circulation. Even at 37 weeks, gestation they are four times more likely than at 40 weeks to have a bilirubin greater than 13 mg/dL⁽¹¹⁾

Most of the cases of neonatal jaundice in this study passed undiagnosed due to limitation in the necessary investigation required to reach exact cause behind the jaundice. In 87 cases (12.21%) jaundiced match the criteria of physiological jaundice which refers to jaundice in the immediate newborn period without signs of illness⁽¹²⁾. In most newborns, total serum bilirubin levels peak between the second to fourth day of life. Early discharge from the hospital of infants less than 48 hours of age, without appropriate and timely follow up, has significantly increased the numbers of newborn re-admissions for management of hyperbilirubinemia⁽¹³⁾.

Sepsis seems to be the next important factor associated with neonatal jaundice and proved by blood culture that reveal bacterial growth in the culture media (10.25%); in sepsis Jaundice occurs in response to decreased hepatic glucuronidation caused by both hepatic dysfunction and increased erythrocyte destruction.⁽¹¹⁾

Blood group incompatibility (ABO and Rh. Incompatibility) are the next common causes associated with neonatal jaundice. Blood group incompatibilities (eg, Rh,

ABO) may increase bilirubin production through increased hemolysis. Historically, Rh isoimmunization was an important cause of severe jaundice, often resulting in the development of kernicterus. Although, this condition has become relatively rare following the use of Rh prophylaxis.⁽²⁾

Treatment modalities in neonatal jaundice give an idea about the severity of jaundice, severe jaundice with or without sign of kernicterus managed by blood exchange transfusion, less severe jaundice treated by phototherapy till the level of bilirubin fall to a save range. in 592 neonates(83.15%) level of bilirubin decreased by phototherapy alone ,recent studies, including a multicenter randomized controlled study, concluded that phototherapy effectively controlled neonatal hyperbilirubinemia without adverse outcome at 6 years and was at least as effective as exchange transfusion alone⁽⁴⁾.

About (16.85%) of the total collected cases undergoes exchange transfusion in the management of jaundice. In a study done on Chinese full-term infants with hyperbilirubinemia born in the Queen Mary Hospital of the University of Hong Kong from 1995 to 2000 only 3% of these neonates needs exchange transfusion, this deference between the frequency of probably due to overestimation in the requirement of these neonates for exchange transfusion and performing this operation in lower bilirubin level. Immediate exchange transfusion is recommended in any infant who is jaundiced with signs of the acute bilirubin encephalopathy including hypertonia, arching, retrocollis and opisthotonos (head and heels drawn back), fever, and high-pitched cry – even if the bilirubin is decreasing.⁽¹⁴⁾

Sepsis found to be among the most common causes of neonatal jaundice, so it should put as a probable cause in each case of neonatal jaundice, and stress should put on examination for jaundice in each case of

neonatal sepsis. Since most causes of neonatal jaundice pass undiagnosed, study recommend more stress on the availability

of more sophisticated investigation to for early diagnosis of diseases that can present as neonatal jaundice.

References

1. Shannon Munro Cohen: Jaundice in the Full-Term Newborn
<http://www.medscape.com/pages/public/copyright>
2. Thor WR Hansen, MD, PhD, MHA, Professor, Section of Neonatology, Department of Pediatrics, Rikshospitalet, University of Oslo Jaundice, Neonatal
<http://www.emedicine.com/cgi-bin/foxweb.exe/screen@/em/ga?book=ped&authorid=3233&topicid=1061>
3. Siberry, GK, Iannone R (Eds): The Harriet Lane Handbook: A Manual for Pediatric House Officers. 15th Edition. St. Louis, Mosby, 2000, pp 257-8
4. MacMahan JR, Stevenson DK, Oski FA: Unconjugated hyperbilirubinemias. In: Avery's Diseases of the Newborn. 7th Edition. Philadelphia, WB Saunders, 1998, pp 1014-20
5. Hart C, Cameron R. The importance of irradiance and area in neonatal phototherapy. *Arch Dis Child Fetal Neonatal Ed.* 2005;90:F437-F440.
6. Stevenson DK, Wong RJ, Vreman HJ, et al. NICHD Conference on Kernicterus: Research on Prevention of Bilirubin-Induced Brain Injury and Kernicterus: Bench-to-Bedside--Diagnostic Methods and Prevention and Treatment Strategies. *J Perinatol.* Aug 2004;24(8):521-5.
7. Kiely M, Drum MA, Kessel K. Early discharge. *Clin Perinatol* 1998;25:539-53.
8. Perstein MA. The late clinical syndrome of poskernicteric encephalopathy. *Pediatr Clin North Am* 1960;7:665-87.
9. Edwards A, Megens A, Peek M, et al: Sexual origins of placental dysfunction. *Lancet* 2000; 355:203-4
10. Clarke C, Mittwoch U: Changes in the male to female ratio at different stages of life. *Br J Obstet Gynaecol* 1995; 102:677-9
11. William W. Hay, Jr : Current pediatric diagnosis and treatment. Sixteenth edition 1999.
12. Parks, D.K., Montgomery, D., & Yetman, R.J. (2000). Perinatal conditions: Jaundice. In C.E. Burns, M.A. Brady, A.M. Dunn, & N.B. Starr (Eds.), *Pediatric primary care.* (2nd ed.) (pp. 1172-1216). Philadelphia: W.B. Saunders Company.
13. Harris, M.C., Bernbaum, J.C., Polin, J.R., Zimmerman, R., & Polin, R.A. (2001). Developmental follow-up of breastfed term and near term infants with marked hyperbilirubinemia. *Pediatrics*, 107(5), 1075-87.
14. Virginia Wong MBBS, FHKAM, FHKC Paed, FRCPCH, FRCP (London, Edinburgh), Short- and Long-Term Outcome of Severe Neonatal Nonhemolytic Hyperbilirubinemia 07/05/2006.

Table (1): Distribution of neonatal jaundice according to sex

Sex	Total admissions	jaundiced pt	%
Male	503	405	80.50
Female	335	307	91.64
total	838	712	84.96

$$X^2=19.48 \quad d.f=1 \quad p<0.05$$

Table (2): Distribution of neonatal jaundice according to gestational age

	Total admissions	jaundiced pt	%
fullterm	764	643	84.16
premature	74	69	93
total	838	712	84.96

$$X^2=4.35 \quad d.f=1 \quad p<0.05$$

Table (3): Causes of neonatal jaundice in Kirkuk pediatric hospital

Causes	No.	(%)
Undiagnosed	488	68.53
Physiological jaundice	87	12.21
Sepsis	73	10.25
ABO incompatibility	26	3.66
Rh incompatibility	21	2.95
Asphyxia	9	1.27
Pneumonia	8	1.13
Total	712	100

Table (4): Mode of treatment of neonatal jaundice in Kirkuk pediatric hospital

Mode of treatment	No. of patient	%	male	%	female	%
phototherapy	592	83.15	332	81.98	260	84.70
Exchange transfusion	120	16.85	73	18.02	47	15.30
total	712	100	405	100	307	100