Risk Factors of Neonatal Jaundice at Al Kadhimiya Pediatrics Hospital in Baghdad, Iraq

Dr. Taha N. Sadeq contactdrtaha@yahoo.com
Dr. Hamid F. Feyad dr.hffh@yahoo.com
Dr. Ghassan R. Abdul Hameed ghassanrasheed70@gmail.com
Al Kadhimiyia Pediatric Hospital
Baghdad, Iraq

Abstract:

Background: *Jaundice is the most common condition that requires medical attention in newborns. Jaundice is observed during the 1st wk after birth in approximately 60% of term infants and 80% of preterm infants. Early identification of neonates at great risk of Neonatal Hyperbilirubinemia is of paramount importance in preventing brain damage.*

Objectives: *to investigate the prevalence and risk factors associated with neonatal jaundice at Al Kadhimiya pediatrics hospital.*

Materials and Methods: *A cross sectional study was conducted at Al Kadhimiya pediatrics hospital. Data collection took place from 8th February 2015 -10th May 2015. Sample size was (160) neonates who were diagnosed with neonatal hyperbilirubinemia. At date of data gathering, a questionnaire developed by the researchers based on literatures review was completed. Verbal Consent to participate in the study was obtained from all parents. Total serum bilirubin was measured using venous sampling. P value <0.05 was considered significant. Statistical analysis was done using SPSS software version 20.*

Results: *753 neonates were treated for hyperbilirubinemia, the total number of live births was 5589. The incidence of neonatal hyperbilirubinemia was 13.47%. ABO blood group incompatibility was the most common cause of hyperbilirubinemia.*

Sample size was 160 (N=160).All of the sample were diagnosed and admitted as neonatal hyperblirubinemia cases. Mean total serum bilirubin level on admission was (15.4±3.6 mg/dl).mean neonatal age in days was (6.2±3.6 days).83(51.9%)of the causes of neonatal jaundice were of unknown etiological factors. Sepsis and ABO incompatibility were the reason for neonatal jaundice in 37(23.1) of the cases.

Conclusion: *Lack of diagnostic capabilities in terms of lab resources led to unknown causes of more than half of the admitted neonatal hyperbilirubinemic cases.*

Keywords: Jaundice, Neonate, Risk factors.

عوامل الاختطار المرتبطة باليرقان الولادي في مستشفى أطفال الكاظمية

د. طه نوري صادق contactdrtaha@yahoo.com
د. حامد فخري فياض dr.hffh@yahoo.com
د. غسان رشيد عبد الحميد ghassanrasheed70@gmail.com
دائرة صحة بغداد - الكرخ - مستشفى اطفال الكاظمية

المستخلص

المقدمة: اليرقان هو الحالة الأكثر شيوعا التي تتطلب اهتماما طبيا في الأطفال حديثي الولادة. يلاحظ اليرقان خلال الأسبوع الأول بعد الولادة في حوالي 60٪ من حديثي الولادة و 80٪ من الاطفال الخدج. إن التعرف المبكر على الأطفال حديثي الولادة المعرضين لخطر كبير للاصابة بارتفاع نسبة البيلروبين في الدم أمر بالغ الأهمية للوقاية من تلف الدماغ.

الأهداف: للتحقق من انتشار وعوامل الاختطار المرتبطة باليرقان الولادي في مستشفى أطفال الكاظمية.

المواد والطرق: أجريت دراسة مقطعية مستعرضة في مستشفى اطفال الكاظمية. تم جمع البيانات من 8 شباط 2015 إلى 10 ايار 2015 وكان حجم العينة (160) طفل حديث ولادة من الذين تم تشخيصهم بارتفاع نسبة البيلروبين في الدم . تم جمع العينة بتصميم استبيان من قبل الباحثين على أساس مراجعة الادبيات المنشورة الخاصة بالموضوع. تم اخذ الموافقة النهائية للمشاركة في الدراسة من قبل جميع ذوي الاطفال . تم قياس مجموع البيلروبين في الدم باستخدام سحب العينات الوريدية. قيمة P <0.05 اعتبرت هامة احصائيا. تم إجراء التحليل الإحصائي باستخدام برنامج SPSS الإصدار 20.

النتائج: تم علاج 753 حديثي الولادة مشخص بارتفاع نسبة البيلروبين في الدم، وكان العدد الإجمالي للولادات الحية 5589. وكان معدل حدوث ارتفاع نسبة البيلروبين عند حديثي الولادة 13.47 ٪.و كان عدم توافق مجموعة دم ABO هو السبب الأكثر شيوعًا لارتفاع نسبة البيلروبين في الدم. كان حجم العينة 160 (N = 160). تم تشخيص جميع العينات وادخالها للعلاج كحالات ارتفاع نسبة البيلروبين في الدم. بلغ متوسط مستوى البيلروبين في الدم عند دخول المريض (15.4 ± 3.6 ملغم / ديسيلتر). كان متوسط عمر المواليد الجدد بالأيام (6.2 ± 3.6 أيام). 83 (51.9٪) من أسباب اليرقان الوليدي غير معروفة الاسباب. 37 (23.1) من الحالات سببها انتان الدم وعدم تطابق صنف الدم . الخلاصة: ضعف الامكانيات التشخيصية من حيث الموارد المختبرية ادت الى عدم معرفة اكثر من نص اسباب حالات ارتفاع البيلروبين في الدم عند الاطفال حديثي الولادة .

الكلمات المفتاحية: اليرقان، الوليد، عوامل الاختطار.

Introduction

Jaundice is the most common condition that requires medical attention in newborns. The yellow coloration of the skin and sclera in newborns with jaundice is the result of accumulation of unconjugated bilirubin [1]. Neonatal jaundice is defined as total bilirubin levels greater than 5 mg/ deciliter (86 micromoles/ liter) [2]. Newborns Jaundice is divided into two groups: physiologic jaundice and pathologic jaundice. Physiological jaundice in newborns is caused as a result of increased bilirubin production, increased red blood cell mass and short-lived red blood cells. Physiologic jaundice begins in the second or third day of life and its peak occurs about the fourth or fifth day of life. Physiological jaundice is very common and usually harmless and is not associated with any disease [2] .Jaundice is observed during the 1st wk after birth in approximately 60% of term infants and 80% of preterm infants. The yellow color usually results from the accumulation of unconjugated, nonpolar, lipid-soluble bilirubin pigment in the skin [3]. Severe Neonatal Hyperbilirubinemia poses a direct threat of kernicterus, a permanent neurological sequel [4]. Early identification of neonates at great risk of Neonatal Hyperbilirubinemia is of paramount importance in preventing brain damage. This study aimed to investigate the prevalence and risk factors associated with neonatal jaundice at Al Kadhimiya pediatrics hospital.

Materials and Methods

A cross sectional study was conducted at Al Kadhimiya pediatrics hospital.The hospital is a 120 bed, secondary center of referral that serve mainly Al Kadhimiya region and the north parts of Baghdad. Neonates who were admitted to the neonatal unit and diagnosed with hyperbilirubinemia were enrolled in this study. The neonatal ward at Al Kadhimiya pediatrics hospital has a capacity of 24 incubators. Data collection took place from 8th February 2015 -10th May 2015. Sample size was (160) neonates who were diagnosed with neonatal hyperbilirubinemia. Date gathering instrument was done using a questionnaire developed by the researchers based on literatures review and included child gender, child body weight at admission, age of admission in days, pregnancy duration, child feeding, cause of jaundice, previous siblings with jaundice, type of delivery, serum bilirubin level at admission. Verbal Consent to participate in the study was obtained from all parents. Total serum bilirubin was measured using venous sampling.

Statistical Analysis

Descriptive statistics were reported as frequencies and percentages. Mean neonatal body weight on admission, mean total serum bilirubin level on admission, mean neonatal age in days were presented as mean and standard deviation. A Pearson product-moment correlation was used to determine the relationship between neonatal body weight on admission, age of admission in days, and total serum bilirubin. *P* value <0.05 was considered significant. Statistical analysis was done using SPSS software version 20.

Results

Sample size was 160 (N=160).All of the sample were diagnosed and admitted as neonatal hyperblirubinemia cases. As shown in (table 1); 95 (59%) of the sample were males.120 (75%) of the sample were products of term delivery.72 (45%) of the neonate were exclusively breast fed.84 (52.5%)of the neonates developed jaundice within the first 5 days of life.113(70.6%) of the neonates were in the normal body weight range (2500-3500gm). As shown in Figure 1;83(51.9%)of the causes of neonatal jaundice were of unknown etiological factors. Sepsis and ABO incompatibility were the reason for neonatal jaundice in 37(23.1) of the cases. 135(84.4%) of the neonate with no previous siblings with jaundice.93 (58.1%) of the sample were normally delivered. Mean neonatal body weight on admission was (2922±493gm).Mean total serum bilirubin level on admission was (15.4±3.6 mg/dl).mean neonatal age in days was (6.2±3.6 days).There was a weak, positive correlation between neonatal weight on admission and total serum bilirubin, which was statistically not significant (r =0.133, n = 160, p =0. .095.). The test also showed that there was a weak, positive correlation between age of neonates in days and total serum bilirubin, which was statistically significant (r =0. .392, n = 160, p =0.000.).

Discussion

In this study the sample size was (160), a study from Nigeria was also resulted in the same sample size (N=160) [5]. In our study, the most common etiological factor for neonatal jaundice was undetermined (51.9%). This high percentage could be attributed to the fact that laboratory investigation tests in Al Kadhimya pediatrics hospital were limited; for example; in the case of neonatal jaundice, the clinician might order thyroid function test to investigate a possible congenital hypothyroidism as a cause of jaundice, but due to the test unavailability the diagnosis will be marked as undetermined. A study from Mashhad, Iran had shown that unknown etiology accounted for 25.4% of neonatal hyperbilirubinemia cases [6]. A study from India had shown that in 245, (32.6%) of the neonates, no etiology or risk factor could be attributed as the cause of hyperbilirubinemia [7]. A Canadian study revealed that in the majority of neonatal hyperbilirubinemia cases the underlying cause was not identified [8].A study from India had shown that 42(35 %) of the causes of neonatal indirect hyperbilirubinemia were Idiopathic causes [9].

A study from Taiwan had revealed that there were 63 neonates without an identified etiology (15.3%) [4]. In this study, Sepsis, ABO and rh incompatibility were the cause of neonatal jaundice in 37(23.1%). An Iranian study investigated the causes of neonatal hyperbilirubinemia requiring blood transfusions, (118) neonates were included in the study and the researchers revealed that the most common causes were ABO incompatibility (38.1%), unknown etiology (25.4%), Rh incompatibility (16.1%), Sepsis(8.5%) [6].A study from India [7] and Turkey [10] had shown that the most common etiology or risk factor implicated was ABO incompatibility.

In disagreement with our study, a study from Taiwan had shown that only 3 out of 413 where sepsis was the cause of hyperbilirubinemia [4]. A study from Pakistan had concluded that sepsis was a significant risk factor in 52% cases of kernicterus [11]. A study from Nigeria had shown that sepsis and prematurity were major diagnosis identified in as a cause for neonatal jaundice in 45% and 20% of the study population [12]. While prematurity was noticed in 39 (24.4%) in our study.

A study from Nigeria has concluded that the leading etiological factors of neonatal jaundice were septicemia (32.5%) and prematurity (17.5%) [5]. Another study from Nigeria had shown that ABO incompatibility and low birth weight were major predisposing/etiologic factors [13]. (11.3%) of the samples with unknown etiologic factors in babies with jaundice. A study from India had shown that ABO incompatibility was a cause of hyperbilirubinemia in 17(14.16%) neonates, septicemia in 10 (8.33%) neonates [9].The majority of the neonates with jaundice had no family history of jaundice, this results is in disagreement with two studies from Iran [14], [15]. (45 %) of the jaundiced neonate were exclusively breast fed. exclusive breastfeeding has historically been an important predictor for jaundice, the mechanism behind the association is not well understood [16]. This result is in agreement with a study from Nigeria which had shown that (90.4%) of the jaundiced neonates were exclusively breastfed [5]. What it is in breast milk that causes excessive jaundice is not known but unsaturated fatty acids or a lipase which inhibits glucuronyl transferase have been suspected [17]. The Taiwanese study had shown that the most common etiology was exclusive breast feeding (38.5%) out of 413 [4].

Extreme hyperbilirubinemia, defined as TSB $\geq$ 25 mg/dL [18] was noted in 3(1.9%) in this study , unlike a study from Taiwan [4] which had shown that (111) neonates (26.9%) of the sample were with marked hyperbilirubinemia .The Taiwanese study has shown that ABO incompatibility was the reason for neonatal hyperbirubinemia in (21.8%) of the cases .In this study 3(1.9%) of the neonatal jaundice was caused by urinary tract infections, a study from Taiwan had concluded that (0.6%) of the neonates only were diagnosed with urinary tract infection as the cause of jaundice (N=413) [4].An Iranian study had concluded that urinary tract infection causes (5.1%) of neonatal hyperbilirubinemia [6]. Although this study had shown that there was a weak, positive correlation between neonatal weight on admission and total serum bilirubin , the two authors of this study believed that this result could be due to confounding factors as other studies had shown that total serum bilirubin is inversely related to neonatal age [19] other studies had shown that although weight loss did not seemed it was the etiology of hyperbilirubinemia but the possibility that it had aggravated the jaundice is great [20,21].

In our study the percentage of normal vaginal delivery (NVD) was (58.1%) and (41.9%) for cesarean section, a study from Iran had reported the same results [22].This study had shown that there was a positive correlation between Age of neonate in days and total serum bilirubin, which means when neonatal age increases in days; the bilirubin level will also increase. The results had shown that (45%) of the neonates were exclusively breast fed and continued to be fed during their hospital stay, a possible explanation for the correlation between neonatal age and bilirubin level could be related to undernourished neonates that led to breastfeeding jaundice which is seen in breastfed babies during the first week of life and it is more likely to occur when babies do not nurse well or the mother's milk is slow to come in [23]. Hospital routines may also limits breastfeeding and in turns leads to undernourished neonates [24].

Adequate amounts of breast milk increase a baby's bowel movements, which help secrete the buildup of bilirubin. Breastfeeding jaundice can occur when a newborn does not get a good start to breastfeeding, has an improper latch, or is supplemented with other substitutes which interfere with breastfeeding [25].

Conclusion

Lack of diagnostic capabilities in terms of lab resources led to unknown causes of more than half of the admitted neonatal hyperbilirubinemic cases.

Recommendations

1. Encourage all the mothers with newborn to practice early and frequent breastfeeding (8-12 times per day for the first few days).
2. Raising awareness among pregnant women about the importance of recognizing jaundice in the first 24 hours, and of seeking urgent medical advice.
3. Adopting National registries of cases of significant hyperbilirubinaemia, kernicterus and exchange transfusions, so the root causes of kernicterus and acute bilirubin encephalopathy can be identified.
4. Due to limited lab resources in Al Kadhimiya pediatrics hospital, we recommend using regional lab hospital resources whereby Lab technicians at Al Kadhimiya pediatrics hospital draw blood samples from cases and then send to the regional hospital lab as a substitute for lack of resources.

Limitations of the study

1- Cephalhaematoma or significant bruising history was not recorded from participants due to lack of supporting documents.
2- Red cell enzyme defects (e.g. G6PD deficiency) or red cell membrane defects (e.g. hereditary spherocytosis) cases if there any were not diagnosed due to the limited laboratory tests.

References

[1] Emedicine.medscape.com. Neonatal Jaundice [Internet]. 2015 [cited 16 June 2015]. Available at: http://emedicine.medscape.com/article/974786-overview

[2] Stoll B, Kliegman R. Jaundice and hyperbilirubinemia in the newborn. Behemen R, Kliegman R, Jenson H (editors), Nelson Textbook in Pediatrics. 18th Ed. WB: Saunders; 2008.P. 756-65.

[3] Kliegman Robert,Stanton Bonita,St Geme Joseph,Schor Nina,. Nelson Textbook of Pediatrics. 20th Ed., Philadelphia, PA. ; 2016.

[4] Weng Y, Cheng S, Chiu Y. Etiological analyses of marked neonatal hyperbilirubinemia in a single institution in Taiwan. Biomedical Journal. 2012;35(2):148.

[5] Onyearugha C, Onyire B, Ugboma H. Neonatal jaundice: Prevalence and associated factors as seen in Federal Medical Centre Abakaliki, Southeast Nigeria. Journal of Clinical Medicine and Research. 2011; 3(3):40-45.

[6] Heydarian F, Majdi M. Severe neonatal hyperbilirubinemia; causes and contributing factors leading to exchange transfusion at Ghaem Hospital in Mashhad. Acta Med Iran 2010; 48(6):399-402.

[7] Shetty A, Kumar B. A study of neonatal hyperbilirubinemia in a tertiary care hospital. International Journal of Medical Science and Public Health. 2014;3(11):1.

[8] Sgro M, Campbell D, Shah V. Incidence and causes of severe neonatal hyperbilirubinemia in Canada. CMAJ 2006; 175(6):587-90.

[9] S.K. K, A.L. D, M.K. D. Risk factors of neonates with indirect hyperbilirubinemia in a tertiary care hospital. International Journal of Basic and Applied Medical Sciences [Internet]. 2014 [cited 19 June 2015];4(1):395-399. Available from: http://www.cibtech.org/jms.htm

[10] Davutoğlu M, Garipardiç M, Güler E, Karabiber H, Erhan D. The etiology of severe neonatal hyperbilirubinemia and complications of exchange transfusion. Turk J Pediatr 2010; 52(2):163-6.

[11] Korejo H, Bhurgri G, Bhand S, Qureshi M, Dahri G, Chohan R. Risk factors for kernicterus in neonatal jaundice. Gomal Journal of Medical Sciences. 2010;8(1).

[12] [12] Israel-Aina Y, Omoigberale A. Risk factors for neonatal jaundice in babies presenting at the University of Benin Teaching Hospital, Benin City. Nig J Paed. 2012;39(4).

[13] Chime H, Egenede J, Arute2 J. Prevalence of Neonatal Jaundice on Central Hospital, Warri, Delta State, Nigeria. Int J Health Res. 2011;4(3):123

[14] Direkvand-Moghadam A, Delpisheh A, Mozafari M, Direkvand-Moghadam A, Karzani P, Saraee P et al. Epidemiological aspects of neonatal jaundice and its relationship with demographic characteristics in the neonates hospitalized in government hospitals in Ilam, 2013. J Bas Res Med Sci. 2014;1(2):48-52.

[15] Javadi T, Mohsen Zadeh A. [Examine the causes of jaundice in newborns admitted in Hospital of shahidmadani khoramabad in 2000]. J Lorestan Uni Med Sci. 2005; 4 & 3(7):73-8. (Persian)

[16] Scrafford C, Mullany L, Katz J, Khatry S, LeClerq S, Darmstadt G et al. Incidence of and risk factors for neonatal jaundice among newborns in southern Nepal. Trop Med Int Health. 2013;18(11):1317-1328.

[17] Health.vic.gov.au. Jaundice in neonates: Neonatal ehandbook - Department of Health and Human Services, Victoria, Australia [Internet]. 2015 [cited 20 June 2015]. Available from: http://www.health.vic.gov.au/neonatalhandbook/conditions/jaundice-in-neonates.htm

[18] Tiker, F. et al. 'Extreme Hyperbilirubinemia In Newborn Infants'. Clinical Pediatrics 45.3 (2006): 257-261. Web.

[19] Boskabadi H, Maamouri G, Bagheri S. Significant Neonatal Weight Loss Related to Idiopathic Neonatal Hyper Bilirubinemia. International Journal of Pediatrics [Internet]. 2014 [cited 20 June 2015];,2(4-1). Available from: http:// ijp.mums.ac.ir

[20] Tarcan A, Tiker F, Vatandas NS, Haberal A, Gurakan B. Weight loss and hypernatremia in breast-fed babies: frequency in neonates with non-hemolytic jaundice. J Paediatr Child Health 2005;41(9):484-7.

[21] Boskabadi H, Maamouri GH, Ebrahimi M, Ghayour-Mobarhan M, Esmaeily H, Sahebkar A, et al. Neonatal hypernatremia and dehydration in infants receiving inadequate breastfeeding. Asia Pac J Clin Nutr 2010;19(3):301-7.

[22] Boskabadi H, Navaei M. Relationship between delivery type and hyperbilirubinemia among jaundice newborns referred to Ghaem hospital within a 6-year period in Mashhad. Journal of Obstetrics & Gynecology 2011;14(4):15-21.

[23] University of Maryland Medical Center. Newborn jaundice [Internet]. 2015 [cited 20 June 2015]. Available from: http://umm.edu/health/medical/ency/articles/newborn-jaundice

[24] Nbci.ca. Breastfeeding and Jaundice [Internet]. 2015 [cited 20 June 2015]. Available from: https://nbci.ca/index.php?option=com_content&view=article&id=79:breastfeeding-and-jaundice&catid=5:information&Itemid=17

[25] American Pregnancy Association. Breastfeeding and Jaundice - American Pregnancy Association [Internet]. 2012 [cited 20 June 2015]. Available from: http://americanpregnancy.org/first-year-of-life/breastfeeding-and-jaundice/

Table 1: Showing distribution of the sample characteristics

		Frequency	Percent
Neonate age category	Less than 1 day	5	3.1
	1-5 days	79	49.4
	5-10 days	61	38.1
	More than 10 days	15	9.4
	Total	**160**	**100.0**
Neonate sex	Male	95	59.4
	Female	65	40.6
	Total	**160**	**100.0**
Pregnancy duration	Term	120	75.0
	Pre term	39	24.4
	Total	**159 (1 missing)**	**99.4**
Neonate feeding	Exclusive breast feeding	72	45.0
	Bottle feeding	24	15.0
	Mixed feeding	64	40.0
	Total	**160**	**100.0**
Cause of jaundice	ABO and Rh incompatibility	37	23.1
	Sepsis	37	23.1
	Urinary tract infection	3	1.9
	Other causes	83	51.9
	Total	**160**	**100.0**
Previous siblings with jaundice	Yes	25	15.6
	No	135	84.4
	Total	**160**	**100.0**
Mode of delivery	Normal vaginal delivery	93	58.1
	Caesarean section delivery	67	41.9
	Total	**160**	**100.0**
Neonatal weight category	Less than 1500g	2	1.3
	1500-2500g	31	19.4
	2500-3500g	113	70.6
	More than 3500g	14	8.8
	Total	**160**	**100.0**

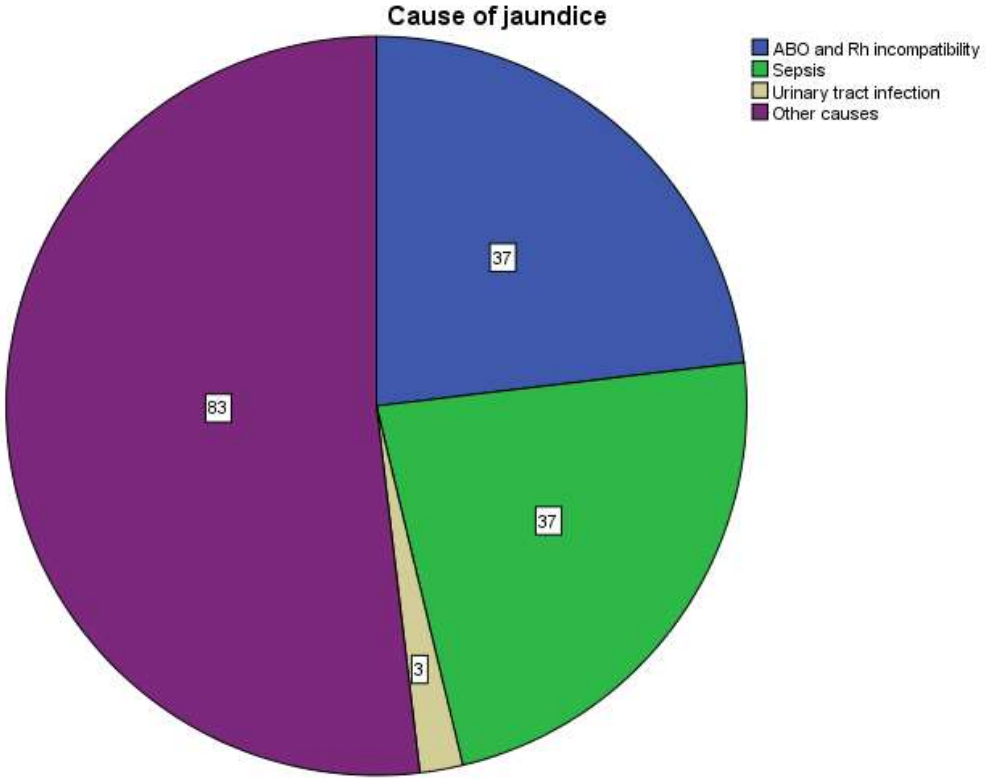

Figure 1: Pie chart showing etiological factors of neonatal jaundice