MEDICAL CHANNEL

Original Article

ETIOLOGY OF NEONATAL JAUNDICE AN EXPERIENCE AT TERTIARY HOSPITAL

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ABSTRACT

***Objectives*:** To identify the causes of neonatal jaundice at National Institute of Child Health, Karachi
Study design: Cross-sectional study.
Setting: Neonatal Intensive Care Unit of National Institute of Child Health, Karachi.
Duration with dates: One year from 27th September, 2006 to 26th September, 2007.
Subjects and methods: Hundred cases of neonatal jaundice included in this study. Procedure was explained to the parents and informed consent was taken. Neonates with congenital anomalies of central nervous system and meningitis were excluded.
Results: Total 100 cases of neonatal jaundice, out of them 62 were male and 38 females. Age range was 1 – 15 days. 56 were in range of 1 – 5 days. Prematurity was seen in 39. Fifty five neonates were of low birth weight. Hypothermia was seen in 44 neonates. Home delivery was conducted in 60 cases. Haemolysis was seen in 30 and Sepsis in 52 respectively. Mean (+ SD) for bilirubin was 27.4 with range (14.5 – 48.4mg/dl).
Conclusion: neonatal jaundice is common condition. Majority of patients delivered at home and presented in late stage. Infection, prematurity and low birth weight, sepsis and hemolysis were common causes documented in this study. This reflects poor antenatal care, lack of parental awareness and falls belief that jaundice will resolve on own, exposure to sunlight or visiting to faith healers

Key words: Kernicterus, Jaundice, Risk factors, Prematurity, Low birth weight.

INTRODUCTION

Neonatal jaundice remains the most common problem in this age group, affecting approximately half of term and two third of the preterm babies.[1] Jaundice typically results from the deposition of un-conjugated bilirubin pigment in the skin and mucous membranes, defines as a total serum bilirubin level above 5mg/dl.[2]

Bilirubin is the final product of heme degradation. At physiologic PH, bilirubin is insoluble in plasma and requires protein binding with albumin, after conjugation in the liver it is excreted in bile. [2]

A newborn infants metabolism of bilirubin is in transition from the fetal stage, during which the placenta is the principal route of elimination of the lipid soluble bilirubin, to the adult stage, during which the water soluble conjugated form is excreted from hepatic cells into the biliary system and then into the gastro-intestinal tract.[3]

Kernicterus a neurologic syndrome resulting from the deposition of unconjugated bilirubin in the basal ganglia and brain stem nuclei. By pathological criteria kernicterus will develop in one third of infants (all gestational age) with untreated hemolytic disease and bilirubin level in excess of 25 – 30mg/dl. Incidence in hyperbilirubinemic premature infants is 2 – 16%. Overt neurologic signs have a grave prognosis; 75% or more of such infants die, and 80% of affected survivors have bilateral choreoathetosis with involuntary muscle sparm.[3]

Severe hyperbilirubinemia defined as total serum bilirubin above the percentile of age

in hours (high risk zone) occurs in 8 – 9% of infants during the first week, with approximately 4% affected after 72 hours. Early onset hyperbilirubinemia is a high risk condition. The aetiology in the majority of these cases is hemolysis from ABO incompatibility, although this might not always be confined.[4]

Hyperbilirubinemia in preterm infants is more prevalent and severe, and its course is more protracted than in term neonates.[5]The current increase in reports of kernicterus re-emergence in the past decade in babies discharged, otherwise as healthy from United States hospitals represents a crisis of credibility. As pediatricians, committed to reducing infant mortality and morbidity, we bear an immense responsibility to the society, when we discharge a new born infant to home after birthing.[6]

In view of 123 cases of neonatal jaundice and kernicterus in infants > 34 weeks of gestation, 88 had comorbid factors such as haemolysis, sepsis and other neonatal complication.[7] Delay in measuring serum bilirubin level despite marked jaundice or initiating phototherapy in the presence of elevated bilirubin levels. Preterm and sick infants and infants with hemolysis require much closer follow-up and more aggressive therapy.[8]

Neonatal physiological jaundice may be aggravated; however by various combinations of 1) augmented bilirubin production e.g. (haemolysis) 2) augmented enterohepatic circulation of unconjugated bilirubin; and hereditary defects, prematurity, or abnormally delayed maturation of the hepatic conjunction mechanism.[9]

All healthy newborns are at potential risk if their jaundice is unmonitored / or managed in appropriately. There is a need to address the social demand for patient safety and to respond to calls for a public health policy to better manage in preventable injury by identifying of risk factors for severe hyperbilirubinemia prior to discharge, lactation support to ensure optimal feeding, and parents education or both hyperbilirubinemia and keeping follow-up appointments.[8,10]

MATERIAL AND METHODS

Setting:

Neonatal Intensive Care Unit of National Institute of Child Health, Karachi.

Duration:

One year from 27th September, 2006 to 26th September, 2007.

Sample Size:

Hundred diagnosed cases of neonatal jaundice.

Sampling Technique:

Non-probability purposive.

SAMPLE SELECTION

Inclusion Criteria:

Neonates presenting with jaundice and its complications were included in study.

Exclusion Criteria:

- Congenital anomalies of central nervous systems.
- Meningitis.

Study design: Cross-Sectional study.

Data collection procedure:

Neonates with clinical diagnosis of jaundice presenting at National Institute of Child Health those in patients were included in study. Purpose and procedure of study were explained to the parents and informed consent was taken from parents. History, clinical examination was done along with investigations. All data was collected on proforma attached.

Data analysis:

Data was entered in computer by using SPSS version 10.0. Frequency and percentages were computed to present all categorical variables including sex, place of delivery, haemolysis, sepsis, prematurity and hypothermia. Mean with standard deviation was computed for age and birth weight of patient. Chi-square test of proportions was applied to check proportion difference for home delivery, sepsis, haemolysis, prematurity and hypothermia at $p < 0.05$ level of significance. Odd ratio was computed for risk factors.

RESULTS

Total 100 neonates presenting with signs and symptoms of jaundice were included in this study. Out of them 62 (62%) were male and 38 (38%) female.

Fifty six (56%) neonates were lie in age range of 1 – 5 days. Mean (± SD) age was 5.5 (± 2.8) Days, with range = 1 – 15 Days. Out of 100 neonates prematurity was seen in 39 (39%), which is significantly higher (P-value is <0.05). Fifty five neonates were low birth weight and 45 (45%) of normal birth weight. Proportional difference was insignificant (P-value = 0.317). Hypothermia was seen only in 44 (44%) neonates. Home delivery was conducted in 60 (60%) cases and hospital delivery in 40 (40%) cases. Haemolysis was seen in 30 (30%) cases and sepsis in 52 (52%) cases.

Distribution of multiple risk factors presented in table-1. Three risk factors were seen in 30 (30%) patients, this proportion is significantly high as compare to the others as p-value < 0.0001, while two risk factors were seen in 26 (26%) patients, four risk factors were seen in 21 (21%) patients and one risk factor was seen in 16 (16%) patients. Two risk factors involved are shown in table-2.

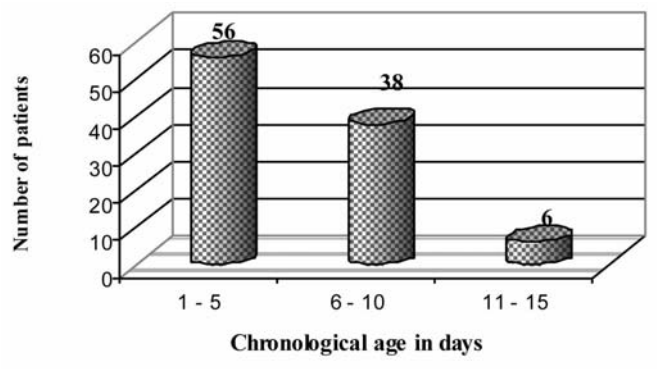
Association of risk factors with genders and odds ratios is shown in table-3. Insignificant associations were seen between gender and low birth weight, haemolysis and sepsis (P-values > 0.05), while significant association was seen in sex and hypothermia as P-value < 0.05

DISCUSSION

Our object of study was to identify risk factors for in neonatal jaundice, which will help in early diagnosis and prevention of complication like kernicterus.

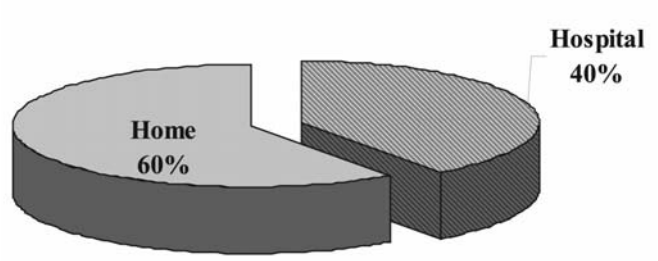
Kernicterus is most serious complications of neonatal jaundice. If neonatal jaundice not treated vigorously, seventy five percent of affected neonates die and eighty percent of survivors had neurological sequelae and handicaps. The exact incidence of kernicterus are not known in Pakistan. Out of hundred neonates 62 (62%) were male and 38 (38%) were female (F:M 1-1:6). This male sex dominance is due to some increased risk of neonatal jaundice in male sex[3] and probably due to parents concern about male babies in our social set up. Among infants reported in the U.S kernicterus registry, 67% of the patients were male. Home delivery was found very significant major risk factor for jaundice its contributing in development of hyperbilirubinemia and kernicterus. Out of hundred cases of kernicterus sixty deliveries were conducted at home with out aseptic measures and these neonates presented in a very late stage of disease required emergency exchange transfusions. A part from late presentation the common notion of Jharwana prevailed in that group. Sepsis was again a common in these neonates as contributing factor. This was supported by the Indian study regarding the causes of jaundice and risk of kernicterus, out of 64 (93%)

DISTRIBUTION OF PATIENTS ACCORDING TO THE CHRONOLOGICAL AGE
(n = 100)



Mean± SD = 5.5± 2.8 Days
Rang = 1 – 15 Days

DISTRIBUTION OF THE PATIENTS ACCORDING TO PLACE OF DELIVERY
(n = 100)



DISTRIBUTION OF THE PATIENTS ACCORDING TO HAEMOLYSIS
(n = 100)

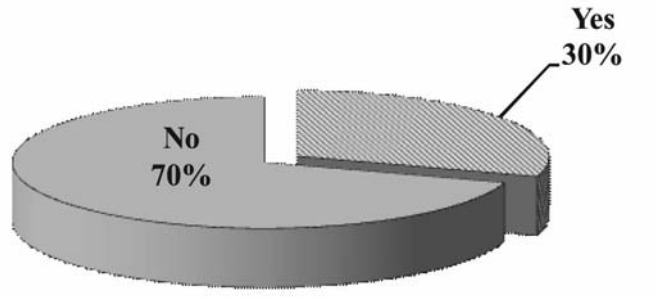


Table-1
MULTIPLE RISK FACTORS INVOLVED
(n = 100)

Risk Factors Involved	Number of Patients (%)
No Risk Factors	1 (1)
One Risk Factor	16 (16)
Two Risk Factors	26 (26)
Three Risk Factors	30 (30)*
Four Risk Factors	21 (21)
Five Risk Factors	5 (5)
Six Risk Factors	1 (1)

P-Value < 0.0001
*Significantly high

Table-2
TWO RISK FACTORS INVOLVED
n = 100

Risk Factors	Number of patients (%)*
Low Birth Weight and Hypothermia	40 (40)
Pre-Term and Low Birth Weight	39 (39)
Pre-Term and Hypothermia	33 (33)
Low Birth Weight and Sepsis	30 (30)
Place of Delivery and Sepsis	29 (29)
Hypothermia and Sepsis	23 (23)
Low Birth Weight and Place of Delivery	22 (22)
Pre-Term and Haemolysis	17 (17)
Place of Delivery and Haemolysis	17 (17)
Hypothermia and Place of Delivery	16 (16)
Pre-Term and Place of Delivery	13 (13)
Low Birth Weight and Haemolysis	9 (9)
Hypothermia and Haemolysis	8 (8)
Pre-Term and Sepsis	6 (6)
Haemolysis and Sepsis	5 (5)

*Each Out of 100

babies were delivered at home.[9] American Academy of Pediatrics (AAP) subcommittee on hyperbilirubinemia and kernicterus[11] also mentioned the root causes of kernicterus was lack of follow up, failure to recognize risk factors, delay in measuring serum bilirubin level in jaundiced patient and lack of concern regarding the jaundice. This best explained in deliveries conducted at home in our set up without knowing the risk factors of jaundice in these babies.
Prematurity and low birth weight was second most common causes observed in this study. Bhutani VK and Lois Johnson[8] in their study "kernicterus in late preterm infants" stated that prematurity is the significant risk factor for hyperbilirubinemia and is known to be a basis for the increased biologic vulnerability to risk of bilirubin induced neurotoxicity. Other significant risk factor documented in this study was sepsis. Out of 100 cases of sepsis was seen in 52 (52%). This is very much explainable because majority of neonates were preterm and low birth weight and deliveries were conducted at home.

CONCLUSION

Neonatal jaundice is common problem and dangerous complication Kernicterus, is one of the preventable condition if that problem managed vigrously. Majority of patients delivered at home and

Table - 3
ASSOCIATION OF RISK FACTORS WITH SEX
(n = 100)

Risk Factors	Outcomes	SEX		P-Values	Odds Ratio (95% CI)
		Male	Female		
Birth Weight	Normal Low	32 30	13 25	0.09	2.05 (0.89 - 4.7)
Hypothermia	Yes No	21 41	23 15	0.009	0.334 (0.15 - 0.8)
Haemolysis	Yes No	20 42	10 28	0.529	1.33 (0.544 - 3.2)
Sepsis	Yes No	29 33	23 15	0.182	0.573 (0.252 - 1.3)
Place of Delivery	Hospital Home	23 39	24 14	0.01	0.344 (0.15 – 0.79)
Gestational Age	Term Pre-term	42 20	19 19	0.077	2.1 (0.92 – 4.8)

presented in late stages of neonatal jaundice. Infection, prematurity and low birth weight were common risk factors documented in this study. This reflects poor antenatal care, lack of parental awareness and falls belief that jaundice will resolve on own, exposure to sunlight or visiting to faith healers.

SUGGESTIONS

- Clinicians need a systematic approach to identify the infants who may develop severe hyperbilirubinemia and keep them in follow-up.
- Health care providers working with neonates play a key role in identifying and assessing neonates at risk for pathologic jaundice.
- Parents counseling is required for bringing their babies early to prevent kernicterus.

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