International Journal of Contemporary Pediatrics
Patel A et al. Int J Contemp Pediatr. 2021 Jan;8(1):143-146
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20205521

Original Research Article

Clinical profile and aetiological factors of neonatal jaundice from a rural area of Kutch, Gujarat, India

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Received: 05 November 2020
Accepted: 11 December 2020

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ABSTRACT

Background: Etiology of hyperbilirubinemia is not only crucial for optimal management of the patient but also it may have implications for subsequent pregnancies. The objective of this study was to study the clinical profile and the underlying aetiological factors leading to neonatal jaundice in this rural setting of Kutch District, Gujarat, India.
Methods: This prospective observational study was conducted in the neonatal intensive care unit (NICU) and Post Natal ward Gujarat Adani Institute of Medical Science, Bhuj, Kutch, Gujarat. Total of 150 cases were enrolled for the study. Blood grouping and Rh typing of baby and mother were done. Cord blood bilirubin and haemoglobin, direct coomb's test (DCT) and bilirubin monitoring were done whenever there was a setting for Rh incompatibility.
Results: Among 150 neonates studied, majority had birth weight between 2501g and 3000g. Only 21 babies had birth weight <2.5kg (14%) (Table 2). Of the 150 neonates 85 were males and 65 were females.
Conclusions: This study concludes that physiological jaundice is the most common cause of neonatal jaundice in our hospital. This is followed by ABO incompatibility, sepsis, Rh incompatibility and idiopathic cases.

Keywords: ABO incompatibility etiology, Hyperbilirubinemia, Neonates

INTRODUCTION

Jaundice is yellow discolouration of the skin and sclera that occurs when levels of bilirubin are increased. Bilirubin is a product of heme catabolism, and 80% to 90% of hyperbilirubinemia occurs due to the breakdown of haemoglobin.[1] Neonatal hyperbilirubinemia occurs due to a variety of factors. It may be physiological or pathological. Neonatal hyperbilirubinemia is a common condition requiring inpatient treatment, as well as an important reason for readmission to hospital.[2-4] It occurs in 70–80% of the neonates, more commonly in preterms.[5,6] Although, only 5–10% of the newborns need to be treated due to pathological hyperbilir-ubinemia, the threat of neurologic damage always remains, especially with very high bilirubin level, in presence of certain risk factors and in cases where management remains inappropriate.[7,8]

Severe neonatal jaundice has the potential to cause bilirubin encephalopathy (kernicterus) which can evolve into chronic and permanent neurological sequelae. Thus, survivors may suffer from severe neurological handicaps like cerebral palsy, gaze palsies and deafness. This sequela is irreversible, but can be prevented by early diagnosis and appropriate management of neonatal jaundice. For the management to be appropriate, identification of the etiological and risk factors is of paramount importance.

Etiology of hyperbilirubinemia is not only crucial for optimal management of the patient but also it may have

implications for subsequent pregnancies. However, the etiology of neonatal hyperbilirubinemia may remain obscured in more than half of the cases.[9-11] Hemolytic disease of the newborn (HDN) is one of the common pathologic cause of hyperbilirubinemia during the early neonatal period, mostly due to Rhesus (Rh) incompatibility, ABO incompatibility, G6PD deficiency, and rarely induced by other alloimmune anti-bodies.[10,11]

The incidence, etiological and contributory factors of neonatal jaundice vary according to ethnic and geographic differences.[12] These factors in developing countries may be different from those of developed nations, probably as a result of racial, cultural and environmental differences.

A recent meta-analysis of neonatal jaundice in low and middle income countries highlighted the need for more robust epidemiological studies to identify additional risk factors that may be particular to these settings.[13] The objective of this study was to study the clinical profile and the underlying aetiological factors leading to neonatal jaundice in this rural setting of Kutch District, Gujarat, India.

METHODS

This prospective observational study was conducted in the neonatal intensive care unit (NICU) and Post Natal ward Gujarat Adani Institute of Medical Science, Bhuj, Kutch, Gujarat. The study was conducted over a period of 8 months. A total of 450 neonates were admitted in our NICU and post-natal ward during the specified period. Out of these 150 newborns were jaundiced (Serum bilirubin >10 mg/dl). So a total of 150 cases were enrolled for the study. Babies attending outpatient department only, were excluded from the study. Informed consent was obtained from the parents.

Inclusion criteria

Neonates with jaundice admitted in NICU or neonatology ward during study period, with serum bilirubin more than 10mg/dL.

Exclusion criteria

Neonates with jaundice not admitted inn NICU, attending outpatient department only. Neonates with jaundice opted discharge against medical advice. Parents not willing to participate in this study.

Jaundice was ascertained by clinical methods. This was confirmed with the help of biochemical tests. Serum bilirubin was estimated by Van den Bergh method.

Detailed history was taken. Thorough physical examination was done and the relevant investigations were carried out. General data including age, birth weight, age at detection of jaundice, breast feeding status, family history of jaundice was documented. Further investigations were not carried out on those babies who were having physiological jaundice. Blood grouping and Rh typing of baby and mother were done. Cord blood bilirubin and haemoglobin, direct coomb's test (DCT) and bilirubin monitoring were done whenever there was a setting for Rh incompatibility. In case of ABO incompatibility, DCT was done and bilirubin monitored. Other investigations like haemoglobin level, peripheral smear and reticulocyte count were done. If these tests showed features of haemolysis and there was no blood group incompatibility, G6PD assay, sickling test, haemoglobin electrophoresis and osmotic fragility test were done wherever appropriate. Neonates who were suspected to have sepsis were investigated by complete blood count, septic screen and blood and urine cultures.

Statistical analysis

The data were analyzed using SPSS version 15. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

RESULTS

Out of 150 jaundiced neonates, 140 were born at term and the remaining 10 were preterm babies (Table 1). Among 150 neonates studied, majority had birth weight between 2501g and 3000g. Only 21 babies had birth weight <2.5kg (14%) (Table 2). Of the 150 neonates 85 were males and 65 were females (Table 3). Here maximum number of cases was due to physiological jaundice 60.

Table 1: Distribution of jaundiced neonates according to gestational age.

Gestational age (weeks)	Number	Percentage
> 37	140	93.33
34-36	08	5.3
30-34	02	1.3
Total	150	100

Table 2: Distribution of jaundiced neonates based on birth weight.

Birth weight (grams)	Number	Percentage
1000-1500	02	1.3
1501-2000	07	4.6
2001-2500	12	8
2501-3000	67	44.6
>3000g	62	28
Total	150	100

This was followed by ABO incompatibility. Of these 50% were due to OA incompatibility and 50% due to OB incompatibility. Other common causes were sepsis, Rh incompatibility, idiopathic and prematurity. Neonatal

jaundice was attributed to cephalhematoma and breast feeding in 10 cases each.

Table 3: Gender wise distribution of study participants.

Gender	Number	Percentage
Male	85	56.6
Female	65	43.3
Total	150	100

DISCUSSION

Neonatal jaundice is one of the most common causes of hospitalization of neonates in the first month after birth. In most cases, neonatal jaundice is transient and usually resolving at the end of the first week after birth. But when severe hyperbilirubinemia is present, there is a potential risk for acute bilirubin encephalopathy and kernicterus. This can lead to death in the first months, and infants who are still alive often suffer from mental retardation, movement and balance disorders, seizures, hearing loss at high frequencies, and speech impairment. So, timely diagnosis and treatment of neonatal jaundice are very important to prevent further complications.

In this study of ours, majority of the babies with neonatal jaundice were of term gestation. Only 6.6% of babies studied were preterm. Studies by Bhutani et al and Singhal et al had found a higher percentage of premature babies in their studies.[14,15] Out of 150 neonates studied, 56.6% were males and only 43.3% were females. Higher incidence of significant hyperbilirubinemia in male babies as compared to female babies was found in various other studies.[16]

Physiological jaundice was noted in 40% babies in our study and this is most common group. Normally some icterus appears on the second to third day, reaching its maximum on the second to fourth day and decreasing on the fifth to seventh days, mainly due to liver enzymes have not evolved enough. This jaundice is called physiologic jaundice. Various factors such as maternal diabetes, race, premature infant, medication use of mother, male gender, cephalohaematoma, breastfeeding, weight loss, delayed stools in the baby may be correlated with physiologic jaundice.[17] Since most of these are normal physiological findings, it also increases overall contribution of physiological jaundice in cases of neonatal jaundice. Bahl et al had reported that physiological jaundice contributed to the majority (63.8%) of cases studied.[18]

This was followed by ABO incompatibility as the next leading cause of neonatal jaundice (21.8%). A Canadian study by Sgro et al.[19] reported ABO incompatibility (51.6%) as commonest cause of hyperbilirubinemia, similar to us, followed by G-6PD deficiency (20%), hereditary spherocy-tosis (7%), and sepsis/urinary tract infection (3%). Immune-mediated hemolysis and hyperbilirubinemia are usually related to Rh D and ABO incompatibilities, and rarely due to other minor blood group incompatibilities, such as anti-C, anti-E, anti-c, anti-e, and anti-Kell.[20] ABO hemolytic disease generally occurs in infants of blood group A or B born to group O mothers. Although ABO incompatibility situation exists in about 15% of pregnancies, only a fraction of infants born in this context develop significant hyperbilirubinemia and often it is difficult to predict, even not strongly predicted by the Coomb's test.[21] The diagnosis of ABO hemolytic disease as opposed to ABO incompatibility is generally reserved for those who have a positive Coomb's test and clinical jaundice within first 12–24 h of life. Neonates having O-B incompatibility have been reported to develop hyperbilirubinemia within 24 h of life, more frequently than O-A incompatibility; however, the present study did not find such difference.[22]

Sepsis is known to cause hemolysis and hyperbilirubine-mia, probably by increasing oxidative stress damaging red blood cells that are susceptible to cell injury.[23] Incipient sepsis/ bacteremia has been reported as a rare cause of hyperbilir- ubinemia in the developed world; however, it accounted for 21% of our cases, reflecting poor perinatal care.[24] Most of our sepsis cases were culture negative, probably because most of them were referred cases and had received prior antibiotics. The etiology of hyperbilirubinemia could not be ascertained in 17% of our neonates. Many authors have also been unable to establish the etiology of hyperbilirubinemia in more than half of the cases in their series.[11,12] It emphasizes the need for more thorough investigations to find out the cause and further studies to determine the role of environmental factors and genetic interactions, which may exaggerate hyperbilir-ubinemia when associated with other high-risk conditions.39 Sepsis constituted 11% of the cases studied. This is in concordance with earlier studies which showed a similar trend. Sepsis was found to be the cause of jaundice in 8% neonates by Merchant et al and in 11.6% by Verma et al.[25,26]

Rh incompatibility was responsible for 8% of cases in this study. Bajpai PC et al reported an incidence of 1.6% for Rh incompatibility while Verma et al found that to contribute to 9.8% of the cases.[26,27] There was one case of haemolytic anaemia (0.9%) which was later diagnosed as hereditary spherocytosis. This baby's mother was suffering from hereditary spherocytosis and had undergone splenectomy. We did not get any case of G6PD deficiency in our study. This could be a reflection of regional variation in the aetiology of neonatal jaundice and G6PD deficiency seems to be an uncommon problem in our area. G6PD deficiency was reported in 2.6% neonates by Merchant et al and 3.4% by Narang et al.[9,25]

Although the evidence of hemolysis and positive direct Coomb's test indicates significant immune-mediated hemo-lytic disease, they may not be helpful because of their poor sensitivity and specificity. Thus, the diagnosis

of symp-tomatic immune-mediated hemolytic disease leading to hyperbilirubinemia should be considered in the context of blood group incompatibility that may or may not be accompanied by a positive, direct Coomb's test and/or evidence of hemolysis.

CONCLUSION

This study concludes that physiological jaundice is the most common cause of neonatal jaundice in our hospital. This is followed by ABO incompatibility, sepsis, Rh incompatibility and idiopathic cases. Less common causes are cephalhematoma, breast feeding jaundice and haemolytic anaemia. Parental counselling and monitoring of baby is most important in management of neonatal jaundice. Though there is less incidence of progression to severe hyperbilirubinemia, complications associated to severe hyperbilirubinemia are dangerous.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Patel A, Saradava K, Chauhan H. Clinical profile and aetiological factors of neonatal jaundice from a rural area of Kutch, Gujarat, India. Int J Contemp Pediatr 2021;8:143-6.