FREQUENCY OF COMMON CAUSES OF SEVERE HYPERBILIRUBINEMIA IN NEONATES LEADING TO EXCHANGE TRANSFUSION

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Abstract Neonatal often have hyperbilirubinemia, which may become severe if left untreated. Severe hyperbilirubinemia in neonates that necessitates exchange transfusions may lead to “kernicterus,” which has a high risk of morbidity. This descriptive cross-sectional research examined the medical records of sixty newborns who had exchange transfusions at HMC Peshawar between March 2021 and March 2022 and weighed more than two kilos. There were 22 (36%) females and 38 (64%) males in the group. With 37.2% of cases, ABO incompatibility was the most common reason for exchange transfusions. Other causes, such as cephalohematoma and Crigler-Najjar syndrome, were followed by unidentified causes (26.5%), Rh incompatibility without immune hydrops (15.2%), sepsis (08.3%), and urinary tract infections (05.2%). Exclusive breastfeeding and vaginal deliveries were associated variables. It was discovered that the average serum bilirubin level was 28.5 mg/dl (SD = 09.02). The objective of our study was to identify and quantify the most frequent reasons babies needing exchange transfusions have severe hyperbilirubinemia. This study was conducted in the Department of Pediatrics Medicine Mercy Teaching Hospital Peshawar between March 2021 and March 2022. The causes of severe hyperbilirubinemia in neonates needing an exchange transfusion were investigated in this research using a descriptive cross-sectional methodology. Medical records from HMC Peshawar served as the primary source of information. In all, 60 infants weighing over two kilograms received exchange transfusions within the allotted period. The primary emphasis of the data extraction method was on variables such as serum bilirubin levels, linked diseases, gender, and the cause of hyperbilirubinemia. The causes included ABO incompatibility, Rh incompatibility without immune hydrops, sepsis, urinary tract infection, and cephalohematoma. Further information was also gathered on the kind of feeding and the mode of delivery. Frequencies, percentages, averages, and standard deviations were computed using statistical techniques, mostly descriptive statistics. The results were then examined about the study’s objectives. Twenty-two (36%) and 38 (64%) of the sixty neonates studied for this research were female. ABO incompatibility was shown to be the most common cause of severe hyperbilirubinemia necessitating exchange transfusion, explaining 22 (37.2%) instances. In decreasing order of frequency, the other reasons were: sepsis, 5 (8.3%); urinary tract infection, 3 (5.2%); unidentified causes, 16 (26.5%); Rh incompatibility without immune hydrops, 9 (15.2%); and other causes such as cephalohematoma and Crigler-Najjar syndrome, 2 (3.3%). One interesting finding was that newborns born vaginally and those nursed exclusively were more likely to need an exchange transfusion. The average blood bilirubin level throughout the group was 28.5 mg/dl, with a standard deviation 9.02. This research emphasizes the need to watch for ABO incompatibility in neonates, particularly those delivered vaginally, as it is significantly linked to the requirement for exchange transfusions. The most common reason for exchange transfusions for hyperbilirubinemia was found to be ABO incompatibility. Adolescents who were nursed exclusively, male, and born vaginally were more likely to need an exchange transfusion. Neonatal with ABO incompatibility would need close observation after discharge, particularly if they were vaginally born.

Keywords: Hyperbilirubinemia; whole blood transfusions; kernicterus; incompatibility of blood groups

Introduction

Newborn jaundice, or neonatal hyperbilirubinemia, is prevalent in clinical pediatric practice. Early in life, jaundice affects around 60% of term and 80% of preterm newborns (Maisels et al., 2001). Even while severe hyperbilirubinemia is usually benign, if it is not identified and treated every once, it may cause serious morbidity and fatality in certain cases. Uridine diphosphatase glucuronosyltransferase (UGT),

the liver enzyme that transforms unconjugated bilirubin into its conjugated form, is often immature in newborns (McCulley et al., 2022). Neonatal jaundice is often caused by this physiological immaturity and an elevated bilirubin burden by the fetal haemoglobin's quick breakdown (Hashim et al., 2021). The main issue, however, is what is driving pathologically increased bilirubin levels. Blood group incompatibility, namely ABO and Rh incompatibility, is one well-established factor (Akgül et al., 2013). These ailments may result in hemolytic illness in the infant, which raises the amount of bilirubin. Watchko et al.'s earlier investigation showed that ABO incompatibility was the main cause of infants needing exchange transfusions (Dennery et al., 2001).

Additionally, because of increased hemolysis and impaired bilirubin conjugation, illnesses such as sepsis and urinary tract infections may raise bilirubin levels (Vos et al., 1981). Anatomical conditions like cephalohematomas and metabolic diseases like Crigler-Najjar syndrome are additional uncommon reasons for elevated bilirubin production (Olusanya et al., 2018). If a patient has severe hyperbilirubinemia, early detection and treatment are essential. In severe situations, exchange transfusion is an essential treatment option because it lowers bilirubin levels and prevents kernicterus, which may be fatal if left untreated (Sarici et al., 2004).

Material and methods

Study Design: A descriptive cross-sectional study was used to determine the prevalence and underlying causes of severe hyperbilirubinemia requiring exchange transfusion in newborns.

Setting: The Department of Pedantic HMC Peshawar was the study's location.

Study Period: The study was conducted from March 2021 to March 2022.

Sample size

The research included sixty newborns in terms of sample size and selection. Neonatal weighing more than two kilos with exchange transfusions within the allotted time met the inclusion criteria. Individuals with insufficient medical records were omitted.

Data Collection: A thorough assessment of medical records was conducted. The data extraction aimed to include details about the population (birth weight and gender) and Clinical observations (serum bilirubin levels). The aetiology of hyperbilirubinemia has been determined to be either nonspecific, sepsis, urinary tract infection, cephalohematoma, Rh incompatibility without immunological hydropsys, or ABO incompatibility. Feeding type and delivery mode The data extraction process was consistent using predefined templates.

Ethical Consideration: The hospital's Institutional Review Board granted ethical clearance.

Confidentiality was preserved by anonymizing patient data.

Statistical Analysis: A statistical software SPSS28.0 program was used to input the data. The following descriptive statistics were calculated: means, standard deviations, frequencies, and percentages. Appropriate statistical analyses were used to investigate associations between hyperbilirubinemia and putative risk variables.

Limitations: Because the research was retrospective, a significant portion of the data quality and completeness depended on the accuracy of medical record-keeping. Furthermore, the results may not apply to other people or areas since they are particular to the research environment.

Results

There was a male majority among the 60 newborns examined, with 38 (64%) male and 22 (36%) female. An analysis of the contributing variables to severe hyperbilirubinemia requiring exchange transfusion revealed that ABO incompatibility accounted for 22 (37.2%) cases. 16 (26.5%) neonates had unexplained reasons, and 9 (15.2%) had Rh incompatibility without immunological hydrops. Sepsis accounted for 5 (8.3%) cases, whereas urinary tract infections accounted for 3 (5.2%). Infections were a factor. Cephalohematoma and Crigler-Najjar syndrome were two (3.3%) of the cohort's rarer etiologies.

Regarding the manner of delivery, an intriguing pattern was observed: most neonates undergoing exchange transfusions were vaginal deliveries. Additionally, a strong correlation was found between exclusive breastfeeding and a greater risk of exchange transfusion. Among the chosen newborns, the average blood bilirubin concentration was 28.5 mg/dl, with a standard deviation 9.02. This increased value emphasizes how severe the hyperbilirubinemia is in this group. In summary, ABO incompatibility was the most common cause of severe hyperbilirubinemia in this cohort, despite the identification of several other reasons. Furthermore, feeding and birth habits demonstrated their impact on the probability of exchange transfusion.

Table 1. Risk Factors in Our Patients

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Number of Patients (n=60)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>38</td>
<td>64%</td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>36%</td>
</tr>
<tr>
<td>Cause of Hyperbilirubinemia:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABO Incompatibility</td>
<td>22</td>
<td>37.2%</td>
</tr>
<tr>
<td>Unspecified Causes</td>
<td>16</td>
<td>26.5%</td>
</tr>
<tr>
<td>Rh Incompatibility</td>
<td>9</td>
<td>15.2%</td>
</tr>
</tbody>
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null
meticulous post-delivery monitoring, especially in exclusively breastfed neonates and those delivered vaginally. In conclusion, although often benign, neonatal hyperbilirubinemia requires vigilant monitoring and prompt intervention in severe cases (Chung et al., 2020). As illuminated by this study, recognizing and understanding the causes and risk factors is crucial for timely diagnosis, effective management, and, ultimately, improved neonatal outcomes (Filippidis et al., 2009).

References

Declarations
Data Availability statement
All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate
Not applicable

Consent for publication
Not applicable

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Not applicable

Conflict of Interest
Regarding conflicts of interest, the authors state that their research was carried out independently without
any affiliations or financial ties that could raise concerns about biases.