Original Article

Maternal and Child factors associated with Neonatal jaundice influencing the outcome of Phototherapy in Karimnagar district

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Abstract:

Background: Neonatal jaundice became a pediatric emergency in all the populations. Though it was usually managed by phototherapy consideration of its maternal and child causes was a better choice for its prevention.

Objectives: 1) To know the maternal and child factors associated with the occurrence of Neonatal jaundice (NNJ) and their influence regarding the outcome of phototherapy.

Methods: Records of 65 children suffered from NNJ were scrutinized by two resident doctors, for the maternal and child factors associated with NNJ and for their influence on phototherapy.

Results: NNJ was more observed in rural children, 45 (70%) and in children below 2 years of age 47 (72%). Child factors associated with NNJ were Low birth weight (93.8%) preterm delivery (81.5%) breast feeding (75.4%) IUGR (50%), poor Apgar score (23%) and infections (23%). Maternal factors associated with NNJ were Poverty (91%) less education (90%), unskilled (86%) Young age (78.5%), maternal infections (78.5%), Primigravida (70.8%), and abnormal deliveries (53%) were the leading factors associated with NNJ. Low birth weight in 51 (78%) breast feeding 46 (70%), Preterm delivery 42 (64%) poor Apgar score 7 (10%), and infections 8 (13%) were the predominant child factors affecting outcome of phototherapy. Maternal infections 42 (64%), primigravida 40 (61%)) and abnormal delivery practices 22 (33%) were the maternal factors influencing the outcome of photo therapy.

Conclusions: Both the maternal and child factors contribute a lot while managing NNJ. They will also play a part in its management by phototherapy. Due consideration to these factors is essential while managing and preventing NNJ.

Key words: Neonatal jaundice, Maternal factors, Baby factors, Phototherapy, Karimnagar district

Introduction:

Neonatal jaundice is a major clinical problem globally, especially in Asian and south-east regions, its gravity lies in its affecting the brain as Kernicterus and leading to the death of infants. Several causes like G6PD deficiency, ABO incompatibility, low birth weight and sepsis were known causing this neonatal problem but there is a group of babies whose cause of NNJ has yet to be found. Though phototherapy was undoubtedly the treatment of choice for these babies, it was worthier to elucidate the role of all the mother and child factors with regard to the outcome of phototherapy, to achieve best results without side effects and avoiding the need for exchange blood transfusions.

Hence, this study was conducted to find out the maternal and child factors causing NNJ and their role in the outcome of phototherapy as such studies were rare in this region.
Child factors associated with NNJ:

- Low birth weight (93.8%) preterm delivery (81.5%) breast feeding (75.4%) IUGR (50%) Poor Apgar score (23%) and infections (23%) were the major leading causes associated with NNJ.
- Poverty (91%) less education (90%), unskilled (86%) Young age (78.5%), maternal infections (78.5%), Primigravida (70.8%), and abnormal deliveries (53%) were the leading factors associated with NNJ.
- Low birth weight in 51(78%) breast feeding 46 (70%), Preterm delivery 42 (64%) poor Apgar score 7 (10%), and infections 8(12%) were the predominant factors affecting outcome of phototherapy.
- Maternal infections 42(64%), primigravida 40(61%) and abnormal delivery practices 22(33%) were influencing the outcome of photo therapy.

Maternal factors associated with NNJ:

- Primigravidae, who might have neglected antenatal care, who are ignorant of aseptic delivery practices and who preferred home deliveries, who failed in preventing maternal infections and infections in their babies were the major actors in causing NNJ in their children in the present study.
- Similar situation was observed by Kaini NR in primigravidae. Phototherapy was indicated for NNJ when serum bilirubin exceeds 3mg/dl. Blue light converts toxic serum bilirubin to non-toxic Lumirubin which will be excreted by the kidneys. Several authors proclaimed that phototherapy was the standard treatment of choice as it was safest and easiest blue light treatment to reduce the serum bilirubin to less than 1mg/dl.

Child factors influencing phototherapy:

- Low birth weight, breast fed, prematurity, poor Apgar score children with infections were the most prevalent factors hindering the outcome of the phototherapy in this study. Low birth weight, gestational age were found to have an effect on outcome of phototherapy by Tank KL et al as it was the case in this study.
- It is paradoxical about the effect of breast feeding. Haung A et al found that prolonged breast feeding precipitates NNJ and its continuation clears jaundice slowly.
- Breast feeding was not a risk factor for NNJ / phototherapy in non-Chinese Asian infants and can be continued in children of Indian origin with NNJ.

Maternal factors influencing phototherapy:

- Primigravidae, abnormal deliveries and mothers suffering from infections may result in babies vulnerable for NNJ as in this study. These babies poorly respond to phototherapy, same opinion was expressed by Xiong T et al.

Strengths and limitations:

- Strengths of the study was not only in its fulfilling its objective but also in successful elucidation of the various maternal and child factors responsible for development of NNJ, thereby enabling for prevention and for proper management by phototherapy.

Limitations of the study:

- But, the main limitation was that it was a hospital based secondary study of the records and hence its validity will be of less degree. Most importantly, the most important and well established causes of NNJ, like Rh- incompatibility and ABO incompatibility as neonatal causes in addition to low birth weight and infections. They could not find any cause for NNJ in some babies. Prematurity and neonatal infections were also observed as causes by Kaini NR et al similar to this study. Prematurity, low birth weight and infections were the most common factors in causing NNJ in most of the studies including this study. Premature babies, born before 38 weeks gestation, babies who are not getting enough breast milk, either because of lactation failure or feeding problems, babies whose blood type is not compatible with their mothers were found to be the sufferers from NNJ in studies by the above studies. The same scenario was observed in the present study.

Results:

Neonatal jaundice (NNJ) was observed in 65 children. NNJ was more observed in rural children, 45(70%) and in children below 2 years of age 47(72%). Males and females were almost equally affected, 31(48%) versus 34(52%) respectively. (X^2 df1=1.86; p=0.172; >0.05, not significant) (Table 1)

1. Child factors associated with NNJ (Table 2)
   - Low birth weight (93.8%) preterm delivery (81.5%) breast feeding (75.4%) IUGR (50%) Poor Apgar score (23%) and infections (23%) were the major leading causes associated with NNJ.

2. Maternal factors associated with NNJ: (Table 2)
   - Poverty (91%) less education (90%), unskilled (86%) Young age (78.5%), maternal infections (78.5%), Primigravida (70.8%), and abnormal deliveries (53%) were the leading factors associated with NNJ.

3. Child factors influencing phototherapy (Table 3)
   - Low birth weight in 51(78%) breast feeding 46 (70%), Preterm delivery 42 (64%) poor Apgar score 7 (10%), and infections 8(12%) were the predominant factors affecting outcome of phototherapy.

4. Maternal factors influencing phototherapy: (Table 3)
   - Maternal infections 42(64%), primigravida 40(61%) and abnormal delivery practices 22(33%) were influencing the outcome of photo therapy.

Discussion:

Study population was 65 children with NNJ. Rural children were more affected. Poverty complex i.e. poverty, illiteracy and ignorance was probably the reasons for this health problem in the rural children as it was very much prevalent among rural mothers of these children. No sex predilection was observed in this study while Rijal P et al reported higher incidence in male children.

Child factors associated with NNJ:

- Low birth weight babies, preterm babies, breast fed babies, IUGR babies and babies with poor Apgar score having infections and given oxygen support were affected more in this study. Ho NK et al found G6PD deficiency and ABO incompatibility as neonatal causes in addition to low birth weight and infections. They could not find any cause for NNJ in some babies. Prematurity and neonatal infections were also observed as causes by Kaini NR et al similar to this study. Prematurity, low birth weight and infections were the most common factors in causing NNJ in most of the studies including this study. Premature babies, born before 38 weeks gestation, babies who are not getting enough breast milk, either because of lactation failure or feeding problems, babies whose blood type is not compatible with their mothers were found to be the sufferers from NNJ in studies by the above studies. The same scenario was observed in the present study.

Maternal factors associated with NNJ:

- Poor, less educated, young unskilled mothers from Villages, especially Primigravida, who might have neglected antenatal care, who are ignorant of aseptic delivery practices and who preferred home deliveries, who failed in preventing maternal infections and infections in their babies were the major actors in causing NNJ in their children in the present study. Similar situation was observed by Kaini NR in primigravidae. Phototherapy was indicated for NNJ when serum bilirubin exceeds 3mg/dl. Blue light converts toxic serum bilirubin to non-toxic Lumirubin which will be excreted by the kidneys. Several authors proclaimed that phototherapy was the standard treatment of choice as it was safest and easiest blue light treatment to reduce the serum bilirubin to less than 1mg/dl.

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- But, the main limitation was that it was a hospital based secondary study of the records and hence its validity will be of less degree. Most importantly, the most important and well established causes of NNJ, like Rh- incompatibility and ABO incompatibility, G6PD deficiency, genetic factors, ethnic differences etc could not be investigated due to practical reasons and lack of pertinent data. Omitting these major reasons and lack of pertinent data. Omitting these major causes associated with NNJ.

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Scope for research:

- Lot of scope for research was available in several aspects of NNJ like Screening for the at-risk children for NNJ, improving the techniques of phototherapy, preventive interventions for saving at-risk babies, educating at-risk mothers about NNJ prevention, individual risk factors...
studies, genetic studies, blood incompatibility studies relevant to NNJ, studies regarding the choices and improvement of phototherapy techniques etc were worth trying to eliminate NNJ in children.

**Conclusion:**
Both the maternal and child factors contributed a lot while managing NNJ. They will also play a part in its management by phototherapy. Due consideration to these factors is essential while preventing and managing NNJ.

**Recommendations:**
- Mother leaders, nurses, doctors, paramedical staff must be periodically imparted in screening for the risk factors and NNJ.
- Mothers education to breastfeed the neonates to avoid dehydration and facilitate bilirubin excretion.
- Promotion of Safe institutional deliveries to minimize sepsis in mothers and infants.
- Good antenatal care to avoid abnormal deliveries.
- Screening for at risk mothers and infants for NNJ.
- Testing blood type of both the mothers and infants for ABO incompatibility, Rh incompatibility and G6PD deficiency

**References:**

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Urban males (%)</th>
<th>Urban females (%)</th>
<th>Urban total (%)</th>
<th>Rural males (%)</th>
<th>Rural females (%)</th>
<th>Rural total (%)</th>
<th>Grand total (%)</th>
</tr>
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Table 2: Maternal & Child factors associated with NNJ

<table>
<thead>
<tr>
<th>Maternal Factor</th>
<th>With Factor (%)</th>
<th>Without Factor (%)</th>
<th>Total</th>
<th>Child Factor</th>
<th>With Factor (%)</th>
<th>Without Factor (%)</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Poor SES</td>
<td>59 (90.8)</td>
<td>6 (9.2)</td>
<td>65</td>
<td>LBW</td>
<td>61 (93.8)</td>
<td>4 (6.2)</td>
<td>65</td>
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<tr>
<td>Less Educated</td>
<td>57 (89.7)</td>
<td>8 (12.3)</td>
<td>65</td>
<td>Preterm baby</td>
<td>53 (81.5)</td>
<td>12 (18.5)</td>
<td>65</td>
</tr>
<tr>
<td>Unskilled</td>
<td>56 (86.1)</td>
<td>9 (13.9)</td>
<td>65</td>
<td>Breastfed baby</td>
<td>49 (75.4)</td>
<td>16 (24.6)</td>
<td>65</td>
</tr>
<tr>
<td>Infections</td>
<td>51 (78.5)</td>
<td>14 (21.5)</td>
<td>65</td>
<td>IUGR</td>
<td>33 (50.8)</td>
<td>32 (49.2)</td>
<td>65</td>
</tr>
<tr>
<td>Young age</td>
<td>51 (78.5)</td>
<td>14 (21.5)</td>
<td>65</td>
<td>Oxygen admin</td>
<td>16 (24.6)</td>
<td>49 (75.4)</td>
<td>65</td>
</tr>
<tr>
<td>Primigravida</td>
<td>46 (70.8)</td>
<td>19 (29.2)</td>
<td>65</td>
<td>Poor Apgar score</td>
<td>15 (23.1)</td>
<td>50 (76.9)</td>
<td>65</td>
</tr>
<tr>
<td>Abnormal delivery</td>
<td>35 (53.8)</td>
<td>30 (46.2)</td>
<td>65</td>
<td>Infections in child</td>
<td>15 (23.1)</td>
<td>50 (76.9)</td>
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<tr>
<td>Vegetarian diet</td>
<td>31 (47.7)</td>
<td>34 (52.3)</td>
<td>65</td>
<td>Family history of jaundice</td>
<td>8 (12.3)</td>
<td>57 (87.7)</td>
<td>65</td>
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<tr>
<td>Smoking</td>
<td>28 (43.1)</td>
<td>37 (56.1)</td>
<td>65</td>
<td>High birth order</td>
<td>5 (9.7)</td>
<td>60 (92.3)</td>
<td>65</td>
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<tr>
<td>Previous abortion</td>
<td>19 (29.2)</td>
<td>46 (70.8)</td>
<td>65</td>
<td>Bleeding , cephalohematoma</td>
<td>3 (4.6)</td>
<td>62 (95.4)</td>
<td>65</td>
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<td>Conssanguinity</td>
<td>16 (24.6)</td>
<td>49 (70.8)</td>
<td>65</td>
<td></td>
<td></td>
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<tr>
<td>Home Delivery</td>
<td>16 (24.6)</td>
<td>49 (75.4)</td>
<td>65</td>
<td></td>
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<td>Oral Contraceptive pills</td>
<td>11 (16.9)</td>
<td>54 (83.1)</td>
<td>65</td>
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<tr>
<td>Alcohol</td>
<td>4 (6.2)</td>
<td>61 (93.8)</td>
<td>65</td>
<td></td>
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<tr>
<td>Harmful Drugs</td>
<td>3 (4.6)</td>
<td>62 (95.4)</td>
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</table>

Table 3: Child and maternal factors associated with poor outcome of phototherapy

<table>
<thead>
<tr>
<th>Child factors</th>
<th>No (%)</th>
<th>Mother factors</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low birth weight</td>
<td>51 (78)</td>
<td>Maternal infections</td>
<td>42 (64)</td>
</tr>
<tr>
<td>Breastfed</td>
<td>46 (70)</td>
<td>Primigravida</td>
<td>40 (61)</td>
</tr>
<tr>
<td>Preterm</td>
<td>42 (64)</td>
<td>Abnormal delivery practices</td>
<td>22 (33)</td>
</tr>
<tr>
<td>Poor Apgar score</td>
<td>7 (10%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child Infections</td>
<td>8 (12)</td>
<td></td>
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